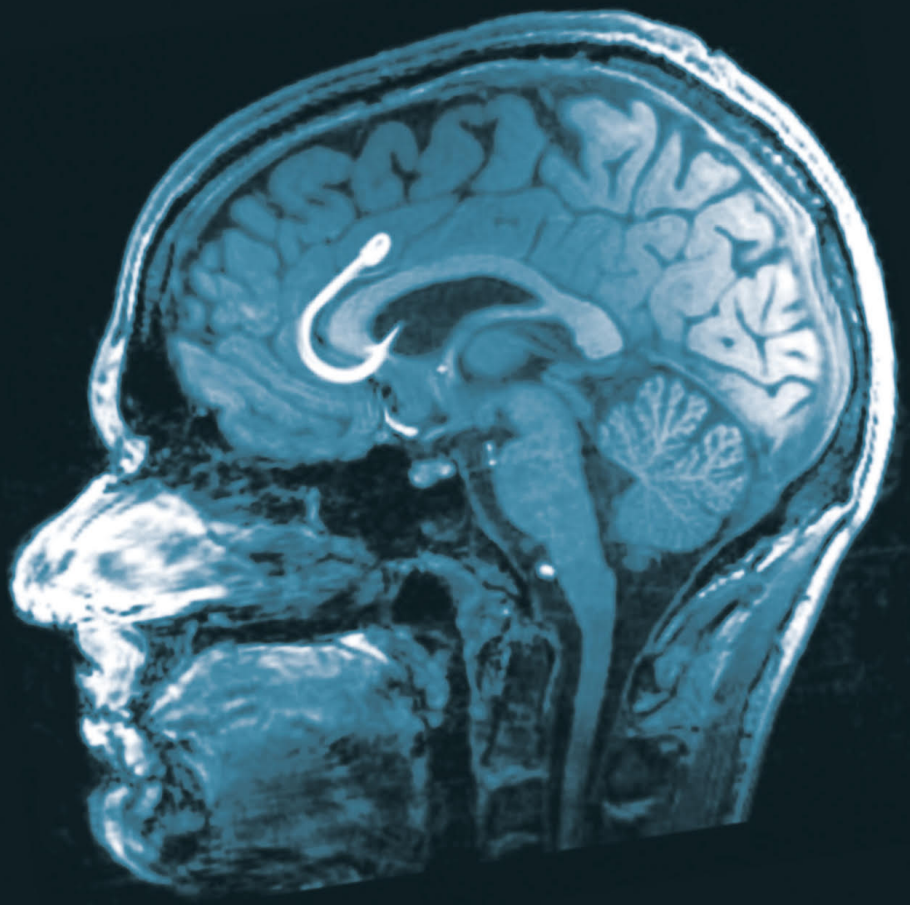
YOUR BRAIN ON PORN

Internet Pornography and the Emerging Science of Addiction



Gary Wilson

Revised and Updated Edition

THE AUTHOR

Gary Wilson taught human pathology, anatomy and physiology for years and has long been interested in the neurochemistry of addiction, mating and bonding. In 2015 the Society for the Advancement of Sexual Health presented Wilson with its Media Award for outstanding media contributions and public education on pornography addiction.

Wilson presented the 2012 TEDx talk “The Great Porn Experiment”, which has been viewed more than 9 million times, and translated into 18 languages. He hosts the website “Your Brain On Porn”, which was created for those seeking to understand and reverse compulsive porn use: http://yourbrainonporn.com.

In 2016, Wilson coauthored an academic paper with seven US Navy doctors entitled, “Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports” and another journal article entitled, “Eliminate Chronic Internet Pornography Use to Reveal Its Effects”. He donates his proceeds from this book to a registered charity that aims to raise awareness of internet porn’s unprecedented effects.

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For A. Masquilier, whose selflessness and foresight made possible the open dialogue that continues to fuel recoveries by the thousands

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FOREWORD

The first edition of this book was finalized a few months after the earliest brain scan studies on internet porn users were published. Since then, scientists have discovered so much about porn's effects on the brain, and otherwise, that a new edition is already overdue. I'll summarize these new advances before turning to a few other interesting developments.

First a brief backward glance: At the end of 2010 I created my website www.YourBrainOnPorn.com. Apart from Norman Doidge MD in his book *The Brain That Changes Itself,* I was virtually alone in applying the principles and discoveries of neuroplasticity to the plight of internet porn users. Addiction, it turns out, is a form of pathological learning, just as porn-induced sexual conditioning is, and brains can change.

Through experimentation, many porn users with severe symptoms found this information comforting and helpful in resolving their porn-induced sexual dysfunctions, morphing sexual tastes, and symptoms of addiction. The latter included the inability to quit despite negative consequences, withdrawal symptoms and distressing escalation to more extreme material (tolerance).

On my website and in the first edition of this book I pointed sufferers to the hundreds of existing studies confirming brain changes (consistent with the addiction model) in gambling addicts, food addicts, and internet addicts. If clicking on Facebook or playing slot machines could lead to addiction related brain changes, then viewing and masturbating to streaming, novel porn certainly could.

In addition to reasonable inferences drawn from existing addiction research, I relied heavily on anecdotes of men (primarily). I did this in part because of the paucity of neurological or other types of research on internet porn users. Most of these men's stories are still in this edition (although it would have been possible to replace them all with similar stories still being shared on recovery forums today). I retain the self-reports because they remain some of the most informative evidence of internet porn's potential effects.

What's different now? In the last three years, researchers have published multiple studies on internet porn users that support the addiction model. Some of the findings also help to explain some of the symptoms in non-addicted porn users, such as sexual problems and morphing sexual tastes.

We will refer to this new research in greater detail in the relevant chapters. But let me set out an overview here. This new research includes some 37 neurological studies on porn users, as well as 12 new reviews of the literature, all by some of the world's top neuroscientists. There are also some 15 studies revealing escalation of porn use or habituation to porn (a sign of tolerance, and of addiction). Among them can be found evidence of both tolerance and withdrawal symptoms. With respect to porn-induced sexual problems there are now 23 studies linking porn use and porn addiction to sexual problems and lower arousal to sexual stimuli. In four of these papers, there is also evidence of causation because the men healed problems by eliminating porn use. In addition, more than 50 studies now link porn use to less sexual and relationship satisfaction. Similarly, some 40 studies link porn use to poorer cognitive function and mental health problems.

Internet porn use is now recognized as a plausible culprit for many of the kinds of problems reported on porn recovery forums. That said, the question of which way causation runs is not yet established to the satisfaction of some scientists. As the saying goes, 'More research is needed.' Of course, diagnostic manuals can't wait indefinitely when patients are suffering. In 2013, the *Diagnostic and Statistical Manual* stalled on adding a specific diagnosis for internet porn addiction, pointing to the scarcity of research. However, the World Health Organization has updated its position in its new *International Classification of Diseases* manual (*ICD*). The *ICD-11* includes a diagnosis for 'Compulsive sexual behaviour disorder'.[1] It is suitable for diagnosing those who struggle with pornography, and will promote research and professional education with respect to pornography's effects.[2]

Since the first edition of this book, I've co-authored two academic papers on the subject of internet porn. Both can be read in full on the internet. The first, "Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports" was written with seven US Navy physicians. It traces the unprecedented rise in sexual dysfunctions in men under 40 and discusses possible underlying causes. The second, "Eliminate Chronic Internet Pornography

Use to Reveal Its Effects" was written at the request of the editors of a Turkish academic journal on addiction following a talk I gave at an international conference in Istanbul on internet addiction. It is evident that other cultures are concerned about porn's possible effects.

More evidence of international concern came in the form of an invitation to speak on "Internet Porn and Sexual Dysfunctions" at a large meeting of Latin American urologists and other professionals from men's sexual health clinics throughout the region. Urologists are seeing an ominous drop in the average age of their patients and are exploring all plausible causes.

The statistics on youthful porn use are finally catching up with the reality. "Young Australians' use of pornography and associations with sexual risk behaviours" reported that 100% of the young men (ages 15 to 29) have viewed porn, and 82% of the young women. Also, the age of first viewing has continued to drop, with 69% of males and 23% of females first viewing porn at age 13 or younger.[3]

Various countries are calling for more research into porn's effects. A handful of states in the US have passed resolutions declaring internet porn use a public health crisis and are calling for further action. A move has also begun (in the UK) to require independent age-verification to enter porn sites. These developments have increased visibility of porn's potential harms and turned up the volume of debate. I hope this updated edition will help answer questions and furnish useful information for this ongoing discussion.

Gary Wilson

August, 2017

INTRODUCTION

I count him braver who overcomes his desires than him who conquers his enemies; for the hardest victory is over self. Aristotle

You might be reading this book because you're curious why hundreds of thousands of porn users around the globe are experimenting with giving it up.[4]

But more likely you're reading it because you are engaging with pornographic material in a way that you find troubling. Maybe you have been spending more time online seeking out graphic material than you want to, despite a settled decision to cut back. Maybe you are finding it difficult to climax during sex, or you're plagued by unreliable erections for which your doctor can find no organic cause. Maybe you're noticing that real partners just don't excite you while online sirens beckon constantly. Maybe you've escalated to fetish material that you find disturbing or out of alignment with your values or even your sexual orientation.

If you're anything like the thousands of other people who have realised that they have a problem, it has probably taken you a while to connect your troubles with your porn use. You might have thought you were struggling with some other disorder. Perhaps you thought you had developed unaccustomed depression or social anxiety or, as one man feared, premature dementia. Or maybe you believed that you had low testosterone or were simply getting older. You might even have been prescribed drugs from a well-meaning doctor. Perhaps your physician assured you that you were wrong to worry about your use of pornography. There are plenty of authoritative voices out there who will tell you that an interest in graphic imagery is perfectly normal, and that therefore internet porn is harmless. While the first claim is true, the second, as we shall see, is not. Although not all porn users develop problems, some do. At the moment, mainstream culture tends to assume that pornography use cannot cause severe symptoms. And, as high-profile criticisms of pornography often come from religious and socially conservative organizations, it's easy for liberally minded people to dismiss them without examination.

But for the last nine years, I have been paying attention to what people say about their experiences with pornography. For even longer, I've been studying what scientists are learning about how our brains work. I am here to tell you that this isn't about liberals and conservatives. It isn't about religious shame or sexual freedom.

This is about the nature of our brains and how they respond to cues from a radically changed environment. This is about the effects of chronic overconsumption of sexual novelty, delivered on demand in endless supply. This is about youthful access to limitless hardcore streaming videos – a phenomenon which is moving so quickly that researchers have not been able to stay current. For example, a 2008 study reported that 14.4 percent of boys were exposed to porn prior to age 13.[5]

By the time stats were gathered in 2011, early exposure had jumped to 48.7 percent.[6] A 2017 cross-sectional study of Australians age 15-29 reports that 69 percent of males and 23 percent of females first viewed porn at age 13 or younger.[7] All of the males and 82 percent of the females had viewed pornography at some point.

Similarly, daily porn viewing was rare in the 2008 study (5.2%), but by 2011, more than 13 percent of adolescents viewed porn daily or almost daily. In 2017, 39 percent of males and 4 percent of females (age 15-29) view daily, often on their smartphones.[8]

Until about a decade ago I had no opinion about internet porn. I thought that two-dimensional images of women were a poor substitute for actual three-dimensional women. But I've never been in favour of banning porn. I grew up in a non-religious family in Seattle, the liberal Northwest. 'Live and let live' was my motto.

However, when men began showing up in my wife's website forum claiming to be addicted to porn it became clear that something serious was going on. A long-time anatomy and physiology teacher, I am particularly interested in neuroplasticity (how experiences alter the brain), the appetite mechanisms of the brain and, by extension, addiction. I'd been keeping up with the biological research in this area, intrigued by discoveries about the physiological underpinnings of our appetites and how they can become dysregulated.

The symptoms these men (and later women) described strongly suggested that their use of pornography had re-trained, and made significant material changes to, their brains. Psychiatrist Norman Doidge explains in his bestseller *The Brain That Changes Itself*:

> *The men at their computers looking at porn ... had been seduced into pornographic training sessions that met all the conditions required for plastic change of brain maps. Since neurons that fire together wire together, these men got massive amounts of practice wiring these images into the pleasure centres of the brain, with the rapt attention necessary for plastic change. ... Each time they felt sexual excitement and had an orgasm when they masturbated, a 'spritz of dopamine', the reward neurotransmitter, consolidated the connections made in the brain during the sessions. Not only did the reward facilitate the behaviour; it provoked none of the embarrassment they felt purchasing Playboy at a store. Here was a behaviour with no 'punishment', only reward.*
>
> *The content of what they found exciting changed as the Web sites introduced themes and scripts that altered their brains without their awareness. Because plasticity is competitive, the brain maps for new, exciting images increased at the expense of what had previously attracted them – the reason, I believe, they began to find their girlfriends less of a turn-on ...*
>
> *As for the patients who became involved in porn, most were able to go cold turkey once they understood the problem and how they were plastically reinforcing it. They found eventually that they were attracted once again to their mates.*

The men on the forum found such material and the research underlying it both comforting and helpful. At last they understood how porn had hijacked the primitive appetite mechanisms of their brains. These ancient brain structures urge us toward evolutionarily beneficial behaviours including an appreciation of novel mates, helping to discourage inbreeding.

However, our behavioural choices in turn affect our neurochemical balance in these same brain structures. This is how chronic overconsumption can have unexpected effects. It can make us hyper-aroused by our favourite enticements, such that immediate wants weigh heavier than they should relative to longer term desires. It can also sour our enjoyment of –

and responsiveness to – everyday pleasures. It can drive us to seek more extreme stimulation. Or cause withdrawal symptoms so severe that they send even the most strong-minded of us bolting for relief. It can also alter our mood, perception and priorities – all without our conscious awareness.

Armed with an account of 'how the machine works' that drew on the best available science, former porn users realized their brains were plastic and that there was a good chance they could reverse porn-induced changes. They decided it made no sense to wait for an expert consensus about whether internet porn was potentially harmful or not when they could eliminate it and track their own results.

These pioneers began to take control of their behaviour and steer for the results they wanted. They saw the gains from consistency without panicking about setbacks, which they now accepted with greater self-compassion.

Along the way, they learned, and shared, some truly fascinating insights about recovery from internet porn-related problems – brand new discoveries that made the return to balance less harrowing for those following in their footsteps. That was fortunate because a flood of younger people, who had begun using internet porn earlier in their lives while their brains were far more malleable, were about to swell the ranks of those seeking relief from porn-related problems.

Sadly, many were motivated by severe sexual dysfunctions (delayed ejaculation, anorgasmia, erectile dysfunction and lack of attraction to real partners). Ominously, as early as 2007 renowned sexology researchers Janssen and Bancroft had stumbled upon evidence that streaming-porn viewing apparently caused erectile difficulties, and that, 'high exposure to erotica seemed to have resulted in a lower responsivity to "vanilla sex" erotica and an increased need for novelty and variation.' Unfortunately, they chose not to raise the alarm, and investigated no further.[9]

In the absence of a warning, persistent porn-induced ED in young men caught the medical profession by surprise. In 2014 doctors finally began to acknowledge it. Harvard urology professor and author of *Why Men Fake It: The Totally Unexpected Truth About Men and Sex*

Abraham Morgentaler said, 'it's hard to know exactly how many young men are suffering from porn-induced ED. But it's clear that this is a new phenomenon, and it's not rare.'[10] Another urologist and author Harry Fisch writes bluntly that porn is killing sex. In his book *The New Naked* he zeroes in on the decisive element: the internet. It 'provided ultra-easy access to something that is fine as an occasional treat but hell for your [sexual] health on a daily basis.'[11]

In May, 2014, the prestigious medical journal *JAMA Psychiatry* published research showing that, even in moderate porn users, use (number of years and current hours per week) correlates with reduced grey matter and decreased sexual responsiveness. The study was subtitled "The Brain on Porn".[12] The researchers cautioned that the heavy porn users' brains might have been pre-shrunken rather than shrunken by porn usage, but favoured degree-of-porn-use as the most plausible explanation. Said lead author Simon Kühn:

> *That could mean that regular consumption of pornography more or less wears out your reward system.*

Then in July 2014, a team of neuroscience experts headed by a psychiatrist at Cambridge University revealed that more than half of the subjects in their study of porn addicts reported

> *that as a result of excessive use of sexually explicit materials, they had ... experienced diminished libido or erectile function specifically in physical relationships with women (although not in relationship to the sexually explicit material).*[13]

Since then, dozens of studies and literature reviews have found evidence of relevant brain changes in internet porn users. However, the pioneers I'm describing didn't have the benefit of any formal confirmation. They worked it all out by exchanging self-reports.

I've written what follows to provide a straightforward summary of what we now know about the effects of pornography on some users, how it relates to the findings of neuroscience and evolutionary biology, and how best we can address the problems associated with pornography, both individually and collectively. If you're experiencing internet porn-related

problems, give me a few hours of undivided attention, and there's a good chance that I can get you on the road to understanding your condition and dealing with it.

Now, how would a guy know if his sluggish sexual performance is related to his porn use or stems instead from performance anxiety (the standard diagnosis for guys without organic below-the-belt problems)?

1. First, see a good urologist and rule out any medical abnormality.
2. Next, on one occasion masturbate to your favourite porn (or simply imagine how it was if you've sworn off it).
3. Then, on another occasion masturbate with no porn and without fantasising about porn.

Compare the quality of your erections and the time it took to climax (if you *can* climax). A healthy young man should have no trouble attaining a full erection and masturbating to orgasm without porn or porn fantasy.

– If you have a strong erection in #2, but erectile dysfunction in #3, then you probably have porn-induced ED.
– If #3 is strong and solid, but you have trouble with a real partner, then you probably have anxiety-related ED.
– If you have problems during both #2 and #3, you may have progressive porn-induced ED or a below-the-belt problem for which you will need medical help.

I begin the book with an account of how internet porn addiction first became an issue as massive numbers of people with access to high-speed porn began talking about the problems they felt it had caused. I'll include first-hand accounts of how the phenomenon unfolded and the symptoms people commonly reported.

The subsequent chapter touches on contemporary neuroscience and the light it sheds on the delicate appetite mechanisms of the brain. I'll summarize some of the recent research on behavioural addiction, sexual conditioning and why adolescent brains are especially vulnerable in the face of a brain-training superstimulus like today's porn.

Chapter three recounts various commonsense approaches people have used to get clear of their porn-related problems as well as some pitfalls to avoid. I don't offer a set protocol. Everyone's circumstances are slightly different and there are no magic bullets. For example, tactics that work well for single people may have to be adapted by someone in a relationship. And younger guys who develop porn-induced ED sometimes need longer than older guys. Often several different approaches are helpful, concurrently or in sequence.

In the conclusion I'll consider why a consensus about porn's risks is still in the future, and which lines of research are most promising. Finally, I'll consider how society might help porn users to make more informed choices.

One final thing before we start. I am not saying that you *should* have a problem with porn. I am not trying to start some kind of moral panic, or to say what is and isn't 'natural' in human sexuality. If you don't feel you have a problem, then I am not about to argue with you. It's up to each of us to decide what we think about graphic sexual content and the industry that produces much of it.

But if you do feel that pornography is harming you, or someone you know, then read on, and I will do my best to explain how internet pornography can produce unexpected effects, and what you can do about it.

WHAT ARE WE DEALING WITH?

It is not the answer that enlightens, but the question. Eugene Ionesco

Most users regard internet porn as a solution – to boredom, sexual frustration, loneliness or stress. However, about ten years ago, some porn users started to connect various problems with their porn use. In 2012, a guy on an online forum known as Reddit/NoFap recounted the history of how men first figured out what they were dealing with (the onomatopoeic term 'fap' is slang for 'masturbation to porn'):

> *Around 2008/2009, people started surfacing on the internet who were freaked out that they had erectile dysfunction, but at the same time they could get a solid erection to varying degrees of extreme porn with the help of some good old deathgrip [masturbation]. The weird thing was, that in some cases, thousands of people responded to these forum posts, saying they had the same exact symptoms.*
>
> *Now, taking those symptoms into account, people figured they'd desensitised themselves to real women by escalating to evermore extreme genres of porn and masturbating [such] that no woman's vagina could match the stimulation. They hoped/guessed that if they'd stop watching porn and masturbating for a significant amount of time this desentisation might be reversed.*
>
> *These people, who back then didn't have YBOP [www. yourbrainonporn.com], NoFap and dozens of other forums on the subject, thought they were alone. The only weird-ass freaks on the planet who can't get it up to a real woman, but find disgusting genres of porn a turn on. A lot of them were still virgins. Others were failing for years with real women, which devastated their confidence. They figured that they would never be able to have a normal fulfilling relationship with a woman, and considering they were freaks of nature, they secluded themselves from society and became hermits. ... [Quitting porn] helped reverse the porn-induced ED of these guys, and besides normal libido they started*

reporting other positive changes too: depression and social anxiety going away, increased confidence, the feeling of fulfilment and being on top of the world...

I'm one of those guys. I'd had several failures with women, starting in the middle of puberty. This had become the single most devastating thing to my psyche. In this modern world, where there's hardly a commercial, a movie, a TV show, or a conversation without sexual innuendos, I was constantly reminded of my weirdness. I was a failure as a man on a very fundamental level and I seemed to be the only one.

A year before I [quit porn] I'd even gone to see psychiatrists and psychologists, who diagnosed me with severe social anxiety disorder and depression, and wanted to put me on antidepressants, which I never agreed to.

When I found out that the central problem of my life that was on my mind 24/7 could be reversed, the heaviest rock was lifted from my heart. When I went on my first NoFap streak (cca 80 days) I started noticing similar superpowers as reported by others. Is that really so weird? The central thing destroying my confidence and making me feel alone on the planet of 7 billion was being reversed, and it turned out to be very common.

Today, on my 109th day of a streak, I feel happy, confident, social, smart, capable of meeting any challenge, etc., etc.

The earliest people to report porn-related problems in online forums were typically computer programmers and information-technology specialists. They had acquired high-speed internet porn ahead of the pack – and then developed uncharacteristic sexual tastes, delayed ejaculation or erectile dysfunction (ED) during sex. Eventually, some experienced ED even while using porn. Nearly all were in their late twenties or older.

As one such forum member noted, internet porn was *different*, oddly irresistible:

With the magazines, porn use was a few times a week and I could basically regulate it 'cause it wasn't really that 'special'. But when I entered the murky world of internet porn, my brain had found something it just wanted more and more of. I was out of control in less than 6 months. Years of mags: no problems. A few months of online porn: hooked.

A bit of history gives us some clues as to why today's pornography might have unexpected effects on the brain. Visual pornography entered the mainstream with magazines, but users had to content themselves with static erotica. Each instalment's novelty and its arousal potential faded fairly quickly, and a person either had to go back to fantasising about his hot neighbour, or make a substantial, perhaps awkward or costly, foray to obtain more material. There were a few x-rated movies and some of them were big commercial successes. Dedicated fans of hardcore could also find sexually explicit clips in adult bookstores. But supply was still restricted to a handful of public or semi-public venues and most people didn't want to spend much time in movie houses or peepshow booths.

Then came video rentals and late-night cable channels. These media were more stimulating than static porn[14,15] and much less awkward to access than a film at the cinema. Yet how many times could a person watch the same video before it was time for another trip to the video shop (and a break)? Viewers often had to watch a story line with an erotic build-up before getting to the hot stuff. Most minors still had very limited access. Next, porn viewers turned to dial-up: private, cheaper, but mostly stills ... at first. People could access it more easily, but it was slow. Material could not be consumed at a click:

> *You had to download the video, then open it and risk getting a virus. Sometimes you didn't have the right software, so you spent a lot of time making sure it was what you wanted to see before downloading it and 'enjoying' it, or you would go to a specific site whose content you liked, watch the one or two new videos and leave it at that.*

All that was about to change. In 2006, high-speed internet gave rise to a whole new creature: galleries of short porn clips of the hottest few minutes of an unending supply of streaming hardcore videos. They are called 'tube sites' because they stream like YouTube videos. The world of porn has never been the same. Users describe the transformation:

> *I'd looked at pictures for years (well over a decade), and video clips from time to time. But when the tube sites became my daily fare, it was only shortly afterward that I developed ED problems. I think the tube sites, with their endless clips immediately accessible, threw my brain into overload.*

*

On a tube site you go straight from 0 to 140 kph. Arousal isn't a slow, relaxed, teasing build-up of expectation. It is straight to full-on orgasmic action. Because tube clips are so short, you do a LOT more clicking to novel clips for various reasons: One is way too short to build up arousal; you don't know what will be in the clip till you watch it; endless curiosity, etc.

*

I can totally relate to 'wanting to watch 10 videos all at once, streaming at the same time...' It's amazing to hear someone else say it. It's like this sensory overload, or hoarding, or just overstuffing yourself with your favourite junk food.

*

Tube sites, especially the big ones, are the crack cocaine of internet pornography. There is so much of it, and so much new content every day, every hour, every 10 minutes that I was always able to find constant new stimulation.

*

Now with high-speed, even to smartphones, it has made me continuously watch more and more and at higher resolution. It sometimes becomes a whole day affair looking for the perfect one to finish on. It never, ever satisfies. 'Need more' the brain always says…such a lie.

*

Before I discovered I had ED I had escalated to tube-site compilation videos, each consisting of the hottest few seconds of dozens of hardcore videos.

*

Highspeed porn changed everything. I began masturbating more than once a day. If I didn't feel like masturbating, but wanted to relieve stress or go to sleep, porn helped me get aroused. I found myself looking at porn prior to sex with my wife because she just couldn't do it for me anymore. Delayed ejaculation was a huge problem: I could no longer orgasm from oral sex and I sometimes had difficulty with orgasm in a vagina.

Deep in a primitive part of the brain, surfing tube sites registers as really valuable because of all the sexual novelty. The extra excitement strengthens brain circuits that urge you to seek porn again and again. Your own sexual fantasies pale in comparison. Interestingly, research confirms that users' problems correlate most closely with factors such as the number of screens opened (variety) and degree of arousal (that is, indications of addiction), not with time spent viewing online porn.[16]

Another risk of today's online porn buffet is overconsumption. University of Massachusetts Medical School professor Sherry Pagoto PhD writes:

Studies on appetite show that variety is strongly associated with overconsumption. You will eat more at a buffet than you will when meatloaf is the only thing on the table. In neither scenario will you leave hungry but in one you will leave regretful. In other words, [if you want to circumvent overconsumption and its problems] avoid the buffets of life.[17]

It's also worth noting that videos replace imagination in a way that still images don't. Left strictly to our imaginations we humans once tended to assume the starring role in our sexual fantasies, not the passive role of mere voyeur as in video-watching. However, some of those who start regular porn use very young are having a different experience:

'Alien' is the word I'd use to describe how it felt when I tried to have sex with real women. It felt artificial and foreign to me. It's like I've gotten so conditioned to sitting in front of a screen jerking it, that my mind considers that to be normal sex instead of real actual sex.

During real sex viewers generally aren't in the position of a voyeur, let alone a voyeur of a particular body part or very specific fetish that many of them have been viewing for years before they connect with a partner.

An Elephant in the Room

At the end of 2010, my wife suggested I set up an online resource about this new phenomenon. By then, her forum on sexual relationships had been overrun by men seeking clues about their porn-related problems: loss of attraction to real partners, delayed ejaculation or complete inability to orgasm during sex, alarming new sexual tastes as they escalated through porn fetishes, even unaccustomed premature ejaculation. She felt they needed a dedicated website where they could read each others' self-reports and keep up on the new research on internet addiction, sexual conditioning and neuroplasticity. From this came the website Your Brain On Porn (YBOP).

Curious as to who was linking to the new resource I began tracking my visitors. I was astonished. Links to the new site popped up in threads all over the web, often in other languages. Men worldwide were looking for answers. At present, YBOP gets as many as 20,000 unique visitors a day. Forums for people quitting porn are popping up and growing rapidly. The largest and oldest English-language forum is Reddit/NoFap (2011) which is more than a quarter of a million members strong at present. Reddit/PornFree boasts over 30,000. There are well over 100,000 Fapstronauts gathered at NoFap.com, RebootNation.org has about 11,000, and YourBrainRebalanced nearly 20,000. The same phenomenon is occurring internationally. For example, in China, three such forums combined currently have three and a half million members struggling to recover from internet porn's effects.[18]

Wherever men congregated one could find them debating porn's effects. Threads – sometimes thousands of posts long – appeared on websites for body-builders, 'pick-up artists', university alumni, those seeking medical advice, car enthusiasts, sports fans, recreational drug users, even guitarists!

Most guys could not believe porn was the culprit behind their symptoms until months after they quit:

After years of porn, I was having trouble with erections. It had been getting worse and worse for a couple years. Needed more and more types of porn stimulation. I was really worried, but the anxiety just pushed me deeper into more extreme porn. Now, the more I go without porn, masturbation, fantasy and orgasm, the more difficult it becomes to not get an erection. LOL. No ED problems or weak ejaculations like I had just a few months ago. I have healed.

Even after quitting and seeing improvements, many were still sceptical. They returned to internet porn – only to see their problems gradually (or swiftly) recur. And even though anonymous online forums were buzzing, at first no one wanted to talk about it publicly:

Young guys won't go to doctors talking about ED. Porn-induced ED and porn addiction are our personal secret. We're too anxious, ashamed, confused and angry to create awareness of these issues. We hide in the shadows because we individually don't want to be seen to exist. Therefore we collectively aren't thought to exist.

For some, quitting triggered distressing, unexpected withdrawal symptoms:

Here's what I'm dealing with: irritability, fatigue, inability to sleep (even sleep aids don't help much), trembling/shaking, lack of focus, shortness of breath, and depression.

*

I've battled a few addictions in my life, from nicotine to alcohol and other substances. I've overcome all of them, and this was by far the most difficult. Urges, crazy thoughts, sleeplessness, feelings of hopelessness, despair, worthlessness, and many more negative things were all part of what I went through with this porn thing. It's a wicked awful thing that I will never have to deal with ever again in my life – ever.

If you don't realise such symptoms are connected with quitting and recovery, but you do notice that returning to porn relieves them, then you are strongly motivated to keep using porn. I'll come back to the withdrawal-symptom hurdle in the recovery chapter.

Most alarmingly of all, those with erectile dysfunction who quit porn often reported temporary, but absolute, loss of libido and abnormally lifeless genitals. Even men with no ED sometimes experienced temporary loss of libido and mild sexual dysfunctions soon after they quit:

> *I have absolutely no sex drive. No spontaneous erections. It's a very strange feeling when you look at a beautiful woman and in your head you have your normal thoughts like 'Wow, she's beautiful. I would like to get to know her!' and yet you have no sexual thoughts or intentions. It's a very strange and for me quite a scary experience. It's like you've been castrated.*

Unless guys had been warned about this 'flatline', fears of permanent impotence sent them rushing back to cyberspace to attempt to salvage their manhood. Escalating to more extreme porn, even with a partially flaccid penis, seemed a small price to pay to stem the total loss of libido. Porn use seemed like a cure.

Many, however, were horrified to discover that they *couldn't* override the flatline by returning to porn. They had to wait until their libido returned naturally – which sometimes took months.

Interestingly, male rats who copulate to sexual exhaustion also show evidence of a mini-flatline before their libido returns.[19] Is the porn-induced flatline biologically related? Researchers study rats because their primitive brain structures are surprisingly similar to ours. As developmental molecular biologist John J. Medina PhD says, animal research 'acts as a guiding "flashlight" for human research, illuminating biological processes'.[20] In other words, researchers aren't studying rats to help *them* with their addictions, erections and mood disorders. Happily, once warned about the possibility of a temporary flatline, most guys powered through it with relative equanimity:

> *About my flatline. When people say they feel like their cock is dead, they aren't exaggerating. It literally feels lifeless. It feels like a burden to have to carry it around.*

As tube sites became more popular and more widely accessed, a flood of younger guys in their early twenties and late teens arrived with the *same* sexual dysfunctions as the older visitors. Rapidly, they comprised the majority of visitors to the websites where men were complaining of what they understood to be porn-induced sexual dysfunctions.

The Other Porn Experiment

By 2011, guys in their early twenties began to set up online forums dedicated entirely to experimenting with giving up internet porn in hopes of reversing porn-related problems. Often they found that it helped to cut out masturbation temporarily too. Indeed, many were unable to masturbate without porn, at least early in the process. Their goal was to give their brains a rest from chronic overstimulation via internet erotica. They called their approach 'rebooting.'

The best-known English-language forum is Reddit/NoFap. Other popular English-language forums include Reboot Nation, Reddit/PornFree, YourBrainRebalanced and NoFap.com.[21] Women are welcome at all of them and their numbers are growing. Some even founded a Reddit/ NoFapWomen. I've been monitoring some of these forums since their inception because members frequently link to YBOP.

This grassroots movement remained largely beneath the radar of the mainstream press, at least until *Time* magazine ran the 2016 cover story "Porn and the Threat to Virility". Thousands of people worldwide have now undertaken the groundbreaking experiment of giving up artificial online sexual stimulation (internet porn, web-cam encounters, erotic literature, surfing escort ads, etc.). Many have shared their results over a period of months.

This vast experiment has been conducted without controls or double-blind protocols (such trials would be impossible because researchers would have to ask some participants to stop masturbating to porn, which is the sort of thing people – whether they're researchers or subjects – notice). It is the only large-scale experiment I know of that removes the variable of porn use and compares histories with subsequent outcomes.

Obviously, 'subjects' are not randomly chosen. They are people who want to experiment with giving up porn. Also, the vast majority are digital natives, not a cross-section of the general population. Moreover, although membership on these porn-challenge forums has mushroomed since the first one started in 2011, they don't reveal the precise percentages of people with porn-related problems in any age group.

Sceptics sometimes claim that people who experiment with quitting must be motivated by religious reasons. Yet all of the forums named above are secular. The largest of these new forums, and likely youngest in terms of average age, conducted a self-poll a couple of years ago. Only 7% had joined for religious reasons.[22]

The information these online forums and threads generate is anecdotal, but it would be a mistake to dismiss it without further investigation. For one thing, the people quitting porn and seeing benefits are surprisingly diverse. They come from different backgrounds, cultures and degrees of religiosity; some are on psychotropic medications; some are in relationships; some smoke and use recreational drugs; some are bodybuilders; their ages cover a wide range, and so forth.

Eliminating Porn Use in Studies

One reason this massive informal experiment has value is because its subjects generally remove the variable of internet porn use. Only a handful of formal studies and case reports have asked participants to do this, and all report significant differences.[23]

Most formal porn studies are correlational. They may tell us interesting things about what effects are *associated* with porn use, but cannot demonstrate which related factor *causes* another (or whether an effect is bi-directional, that is, whether the same factor, e.g., depression, may result from a behaviour in some and promote it in others). In the case of internet porn's effects it is critically important to establish causation.

Why does it matter? It matters because a porn user whose symptoms are the result of porn use cannot heal except by giving it up. Psychologists and psychiatrists are typically trained to assume that certain symptoms indicate underlying pathologies, and that problematic overuse

of a substance or behaviour is therefore a *result* of these disorders. Few healthcare providers are advised to consider that internet overuse can exacerbate those symptoms, or even cause *reversible* symptoms, which merely resemble those of underlying disorders (such as social anxiety, depression, apathy, severe concentration problems or performance anxiety). They risk incorrectly diagnosing patients as having underlying mental disorders and prescribing medications for them that, at best, temporarily mask their symptoms. As medications often have side effects, much misery could be avoided by pinpointing porn use as the cause in those who simply need to abandon its use to resolve their symptoms.

It also matters because only when causation is correctly understood can parents and policymakers make sound decisions about who gains access to internet porn and at what age. This is difficult because academic research is painstakingly slow and narrow (and even slower to self-correct when it goes off course). In contrast, the phenomenon of today's pornography is evolving at lightning speed and may be contributing to a broad range of effects. In the last decade, the technology of porn's delivery has changed so rapidly in ways that increase its risk to users (such as streaming pornography, smartphone access for youngsters and now virtual reality pornography) that by the time a study is released its findings are rapidly becoming obsolete. Even well-designed research dates swiftly, yet academics have little choice but to lean on outdated assumptions in subsequent research. Policymakers do the same thing. To the extent that research lags behind reality, it can fuel poor decisions.

For all these reasons, research that distinguishes which way causation runs is vitally needed. The most practical way researchers can reveal the true effects of porn on users is to design research in which study subjects *give up* porn use for an extended period and researchers measure any changes. It can take months, or even a couple of years, for young men to experience the full benefits of giving up porn use, but most see some benefits long before then. Those who do not may indeed have underlying disorders.

What Does Research That Removes Porn Use Find?

In view of the importance of doing research that establishes the effects of porn by removing it, it is regrettable that only six studies in academic journals have called for porn use to be eliminated to assess its effects. All reported significant changes.

In 2015, researchers correlated porn use with decreased ability to delay gratification when they assessed porn users before and after a 30-day period. Next, they divided participants into two groups. Half were to abstain from their favourite food; half were to abstain from porn. The porn abstainers scored better on their ability to delay gratification. The researchers said, 'The finding suggests that internet pornography is a sexual reward that contributes to delay discounting differently than other natural rewards. It is therefore important to treat pornography as a unique stimulus in reward, impulsivity, and addiction studies and to apply this accordingly in individual as well as relational treatment'.[24]

A 2012 study found that when participants tried to abstain from porn use for three weeks, they reported higher levels of relationship commitment.[25] These two studies demonstrate that even in those who are not addicted, who only endeavour to abstain, and who do so for a mere three weeks, changes are significant.

In an Israeli case study, a man suffering from abnormally low desire for partnered sex, fetishes and anorgasmia, sought treatment. The sexual intervention called for a 6-week abstinence from porn and masturbation. After 8 months the man reported increased sexual desire, successful sex and orgasm, and enjoying 'good sexual practices'.[26]

A 2016 review of the literature related to porn-induced sexual problems co-authored by US Navy doctors included three clinical reports of men who developed porn-induced sexual dysfunctions.[27] Two of the three men healed their sexual dysfunctions by eliminating porn use. The third man was unable to eliminate his porn use.

In 2016 a French psychiatrist reported his clinical experience with 35 men who developed erectile dysfunction and/or anorgasmia related to their habitual porn use.[28] His therapeutic approach involved the men 'unlearning' masturbatory habits associated with their porn use. Sexual dysfunctions regressed in nineteen of the thirty-five patients and these men were able to enjoy satisfactory sexual activity. Three patients were continuing to progress, while thirteen had given up. There is also a UK paper that described a young, male 'composite subject' who recovered from delayed ejaculation after quitting porn.[29]

Finally, in 2016 a European researcher reported preliminary results from a pioneering investigation of the effects of a period of porn and masturbation abstinence by NoFap's Fapstronauts.[30] Results suggest that abstaining:

1. increases the ability to delay rewards,
2. renders people more willing to take risks,
3. renders people more altruistic, and
4. renders people more extroverted, more conscientious, and less neurotic.

Taken together with the thousands of recovery self-reports in online forums, these studies demonstrate the importance of designing research that isolates the variable of internet porn use in order to demonstrate real-life effects on users.

Research Difficulties and Consequences

Researchers have been slow to inform the public that some populations are more at risk with respect to porn problems, such as adolescents, male digital natives and single porn users.[31] Too often scientists report addiction and sexual dysfunction statistics for a country's entire population. Or, if they investigate specific age groups they include females in reported rates. For example, a rare 2017 addiction-rate study reported that in a college population 10.3% of subjects fell within the clinical range for cybersex addiction. You have to read the fine print, however, to learn that almost *one in five* (19%) of college age men were addicted, while less than *one in twenty* (4%) of the women were addicted.[32] Certainly it is appropriate to investigate the effects on all users, but group reporting veils the extent of porn-related problems in the male digital natives who are most at risk.

Researchers investigating male porn users have found rates of porn addiction hovering around 28%.[33,34] Yet these studies and the one in the previous paragraph are virtually unknown in the mainstream press. As a consequence, people who have been using porn

heavily since puberty rarely make the connection between their porn use and symptoms such as social anxiety, depression or weak erections until *after* they stop using. No matter how miserable they are, porn is widely believed to be a way to feel good – a solution rather than a source of problems. In fact, despite the lack of convincing evidence, popular lore has it that frequent masturbation (porn-assisted these days) is a sure-fire prostate cancer preventative.[35]

All this means that there's little point in researchers asking subjects if their porn use has caused their symptoms. Most have no idea. For example, unless they've tried partnered sex, even those with incipient porn-induced sexual dysfunctions may be unaware of them. Most virgins manage to masturbate to climax using porn and naturally presume they would be superstuds in the sack.

Porn users are given little reason to suspect that porn can cause symptoms. Instead society has put their problems in neat little boxes that do not take account of internet overuse. Today's porn users are regularly diagnosed with, and prescribed treatment for, social anxiety, low self-esteem, concentration problems, lack of motivation, depression, and other conditions. They can even be told that their problem is definitely performance anxiety when they are unable to achieve an erection or climax on their own without porn.

Some quietly suffer with panic that their sexual orientations have mysteriously morphed, or that they must be closet perverts because they eventually can *only* get off to illegal or unnerving fetish porn, or that they will never be able to have sex, and thus intimacy, because of their sexual dysfunctions. Not to be alarmist, but I read far too many recovery accounts that mention earlier suicidal thoughts. Disturbingly, research at Oxford University found that moderate or severe addiction to the internet was associated with increased risk for self-harm.[36] Here are comments by three guys:

> *I have seriously considered suicide throughout my life because of these issues but I was able to cope until I found out porn was the problem. 115 days later I have finally broken free of its chains. It's still tough, but I know if I don't use it I'll be able to have sex with my beautiful girlfriend the next day.*

*

Staying off porn really makes a difference! I thought it was impossible to quit porn to the point of contemplating castration and suicide. Here's one thing I actually didn't know that helped me out: People who view 'transsexual' porn do it because of all the stimulation, and even the producers admit that they make this fetish for a straight audience. My thoughts that I might have been bi/gay were more of an optical/psychological illusion.

*

As a child I was highly athletic, smart, and sociable. I was always happy and had a million friends. That all changed around age 11 when I downloaded KaZaA and progressed to nearly every type of porn imaginable (dominatrix, animal, amputee, etc.). I started having severe depression and anxiety. The next 15 years of my life were completely miserable. I was incredibly anti-social. I didn't talk to anybody and sat alone at lunch. I hated everyone. I quit all the sports that I played even though I was top rank in all of them. My marks plummeted to barely passable. As much as I hate to think about it now, I had even started thinking about planning my own 'Columbine style' exit to this world.

After people quit using porn, the benefits they report are often staggering. Indirectly, their experience suggests that some brains have been profoundly affected by today's super-stimulating high-speed porn. As we'll see, formal research is now starting to bear out their reports even while causal direction is still debated. Correlations are turning up between porn use, or problematic porn use, and many phenomena seen regularly on the forums, such as depression, anxiety, stress, social anxiety, attention problems, loss of attraction to real people, sexual dysfunction, sexual and relationship dissatisfaction, altered sexual tastes, and consumption of increasingly extreme material.

Given the weight of first person testimony from these forums worldwide demonstrating that eliminating porn use has profound effects, the emphasis should be on further research that sheds light on the mechanics of what is actually happening. Research could also help sort the porn-afflicted from those with other disorders, such as those stemming from childhood trauma and attachment problems. It goes without saying that not everyone's problems can be traced back to internet porn use. It also goes without saying that an attraction to transgender

people, an interest in being dominated, and any number of other things, can form part of a durable and happy sexual identity. The problem is in the effects of porn on the brain, not in any particular aspect of human beings' colourful diversity in matters of desire.

Common Symptoms

Although most early trials in giving up internet porn were desperate ploys to reverse deteriorating sexual function, today many people make the experiment in order to gain a whole range of benefits. In this section you'll find a sprinkling of self-reports describing improvements after quitting porn, broken down into categories. But many users see a wide range of diverse improvements. For example, this ex-user wrote:

Improvements since quitting:
– Social anxiety improved drastically – includes confidence, eye contact, comfort interacting, smoothness, etc.
– More energy in general
– Clearer, sharper mind, more concentration
– More vibrant looking face
– Depression alleviated
– Desire to interact with women
– Boners are back!!

Another guy described himself *during* his porn use:

– My friends were drifting away. I gave up socialising to sit in my room and pleasure myself.
– My family loved me unconditionally, but did not enjoy my company.
– I had trouble focusing on my job and as well as my classes at my university.
– I had no girlfriend.
– I had an enormous amount of anxiety with human interactions in general.
– I worked out furiously, but never seemed to gain anything.
– Everyone told me I was mentally checked out. I even caught a glimpse of me in a video and you could see a blank stare in my eyes. No one was home. Definition of space cadet.

– No ENERGY, no matter how much I slept, NONE. NOTHING. AT ALL. Always tired. Bags under my eyes, pale, acne, and dehydrated.
– I was terribly depressed.
– I had porn-induced ED.
– I was stressed, anxious, confused, and lost.
– I was not living life, but I was not dead either. I was a zombie.

People naturally wonder how such disparate symptoms could be associated with internet porn use, and what physiological changes might be behind the improvements. They also wonder why some users see different results or no results. Research on the underlying reasons for internet porn's effects is just beginning, but in the next chapter I'll hypothesize based on the abundant relevant science already available on brain plasticity and internet use.

Meanwhile, let's take a closer look at people's accounts of *what* they're experiencing.

Interfering with life, losing control

Inability to control use and use that interferes with one's life are two cardinal signs of addiction. Priorities have shifted due to changes in the brain that we'll look at later. In effect, life's natural rewards, such as friendship, exercise and accomplishment, can no longer compete. Your brain now believes that IT – in this case internet porn use – is an important goal, and equates it with your survival:

Most days I would wank so much that by the end of the day when I orgasmed nothing would even come out. ED my first time sent me into a porn spiral. I would literally wake up, roll over and masturbate, masturbate all day, then at night masturbate and go to sleep. 6 times a day or more, no joke. Safe to say my life was an absolute mess, all the bad effects of porn x 10. I knew that the porn and masturbation was affecting me but I was in denial, masturbation is good for you right? You can't be addicted to porn.

*

My lowest point was when I lost out on my pharmacy diploma and lost my girlfriend on the same day, due to porn and procrastination.

*

I used transgender porn to get hard so I could finish with heterosexual porn. Without realizing, I was soon watching a lot of taboo and extreme porn that I never would have considered a couple of years ago. I couldn't believe I let myself get to this point. I just couldn't stop myself.

*

(Female) I can get off a ridiculous amount of times in one night because the female biological makeup allows it. Many females (not all) spend a lot of time not with porn, but with erotica. We fantasise a lot to get off, while men are very visual. With the internet, it's easy to find erotica everywhere, and there are entire forums dedicated to the type of erotica you want. At my worst, I would have 7 or 8 different sites open and go through them for about 3 or 4 hours or more looking for the perfect sex story to get off on.

*

I thought that it was due to an increased libido that I watched so much porn. Now I know I was wrong. I had an addiction. I barely went out and most certainly didn't have any female contacts.

*

Before I quit I felt like shit 24/7. I had zero energy, and zero motivation. I was lethargic for every hour of every day. I didn't eat right. I didn't exercise. I didn't study. I didn't care about personal hygiene. And I could not care. In the state that I was in, it was extremely difficult to stand for more than 3 minutes, let alone do something productive. I'm over a month now and I feel so much better.

*

Everything from my social life to my physical health has been damaged by this addiction. The worst part about it was that I constantly justified it in my head by saying it was 'healthy for me' and 'at least it isn't a drug'.

*

During the heights of my porn addiction, I never looked forward to much of anything: dreaded going to work, and never saw socializing with friends and family as all that great, especially in comparison to my porn rituals, which gave me more pleasure and stimulation than anything else. With the addiction gone, little things make me really happy. I find myself laughing often, smiling for no real reason, and just being in good spirits all around.

*

I thought I was a pessimist, but really I was just an addict.

Inability to orgasm during sex

Years of porn use can cause a variety of sexual symptoms, which when examined, lie on a spectrum. Often porn users report that delayed ejaculation (DE) or inability to orgasm (anorgasmia) was a precursor to full blown erectile dysfunction. Any of the following may precede or accompany delayed ejaculation and erectile dysfunction:

– Earlier genres of porn are no longer exciting.
– Uncharacteristic fetishes develop.
– Porn use is more sexually exciting than a partner.
– Sensitivity of penis decreases.
– Sexual arousal with sexual partners declines.
– Erections fade when attempting penetration or shortly thereafter.
– Penetrative sex is not stimulating.
– Porn fantasy is necessary to maintain erection or interest with partner.

A 2015 study on sex clinic patients found that 71% of men who masturbated to porn more than seven hours a week reported sexual functioning problems, with 33% reporting delayed ejaculation.35 In three of the five studies listed earlier, in which subjects removed porn use, anorgasmia healed. Not surprisingly, seven other papers report links between porn use and lower sexual desire or difficulty climaxing.[37]

A few examples from the forums:

I'm so happy right now! I'm a 25-year old male and until last night I had never orgasmed in the presence of a female. I have had sex but never, ever been close to climaxing through any stimulation whatsoever. I started out like most of you, using internet porn from around the age of 15. If only I'd known what I was doing to myself.

*

(Age 29) 17 years of masturbation and 12 years of escalating to extreme/fetish porn. I started to lose interest in real sex. The build up and release from porn became stronger than it was from sex. Porn offers unlimited variety. I could choose what I want to see in the moment. My delayed ejaculation during sex became so bad that sometimes I couldn't orgasm at all. This killed my last desire to have sex.

*

I've lived with delayed ejaculation all my life and I've never found anyone (including docs) who are familiar with the dysfunction or have any suggestions for improving it. I began using Viagra and Cialis to help me keep it up long enough to have an orgasm – often well over an hour of intense stimulation. I thought regular doses of porn were also necessary. Good news: by staying away from porn, I am now experiencing some of the most satisfying sex of my life with no ED meds; and I've got two decades on most of you. My erections are more frequent, firmer and longer lasting, and our lovemaking is relaxing and lasts as long as both of us want it to.

*

(4 months without porn) Yesterday was my birthday, and my girlfriend and I had sex. We've been sexually active for months, but I had never orgasmed once during sex, until yesterday. It was the greatest feeling ever. It's a huge weight lifted off both my shoulders and my girlfriend's, as she was feeling rather self-conscious about the issue.

*

I had some pretty bad delayed ejaculation problems with my previous girlfriend. I'm talking 2-3 hours of sex for me to be able to get off (so usually I ended up just stopping and going home and fapping).

*

My success continues in week 10 of my reboot ... an even better session with the missus tonight. Not only did I blow my load relatively quickly (defeating DE), I did it without having to go as vigorously as I usually would to finish. I went slow all the way, like never before, and it was brilliant. I could even say that I tried to back right off towards the end as I didn't want to finish so soon! Not bad for someone with a bad case of DE for a number of years.

Unreliable erections during sexual encounters

As mentioned, on most forums ED is the number-one motivation for eliminating porn. Eminent urologist Harry Fisch, MD is also seeing porn-related sexual dysfunctions in his practice. In *The New Naked* he writes:

I can tell how much porn a man watches as soon as he starts talking candidly about any sexual dysfunction he has ... A man who masturbates frequently can soon develop erection problems when he's with his partner. Add porn to the mix, and he can become unable to have sex ... A penis that has grown accustomed to a particular kind of sensation leading to rapid ejaculation will not work the same way when it's aroused differently.

Between 1948 and 2002, historical rates of ED for men under 40 were consistently 2%–3% and did not begin to rise steeply until after age 40.[38,39]40,41 However, since 2010, six studies have found ED rates of 14%–33% in young men, a 1000% increase in the last 15 years.[40]

More evidence of an unprecedented increase in sexual dysfunctions comes from a sexual function survey (Global Study of Sexual Attitudes and Behaviour) administered to large numbers of men in several European in countries. In 2001–2002, the survey was administered to 13,618 sexually active men in 29 countries.[41] A decade later, in 2011, it was administered to 2,737 sexually active men in Croatia, Norway, and Portugal.[42] The 2001–2002 group was aged 40–80. The 2011 group was 40 and under. Based on historical studies, older men would be expected to have far higher ED rates than younger men (see above). However, in just a decade, things had changed radically. While the 2001–2002 rates for men 40–80 were about 13% in Europe, by 2011, ED rates in young Europeans aged 18–40 ranged from 14% to 28%.

In short, multiple studies from the last decade using a variety of assessment instruments reveal evidence that difficulties during partnered sex are affecting as many as one in three young men.

Adolescent males are suffering disproportionately. In 2016 a Canadian sexologists' study showed that problems in sexual functioning are curiously higher in adolescent males than in adult males (which have been rising). Over a two-year period 78.6% of males (age 16-21) reported a sexual problem during partnered sexual activity. Erectile dysfunction (45%), low desire (46%) and difficulty orgasming (24%) were the most common.[43]

Incidentally, female sexual problems were high too. For example, nearly half of the females (47.9%) reported pain during partnered sex. In 2014, a British team puzzled by the frequency with which young people reported engaging in heterosexual anal sex undertook a qualitative study on participants age 16-18. Results? 'Anal heterosex often appeared to be painful, risky and coercive, particularly for women.'[44]

High rates of limp penises and low sexual desire in teenage males should make everyone take notice as being extremely surprising. Imagine how unheard of these conditions would be in young bulls and stallions. The sexologists who gathered the data for the adolescent study

were 'unclear' why they found such high rates, and didn't even mention internet porn overuse as a possible influence.

Yet in my view, no other variable has changed in the last twenty years that could possibly account for a tremendous rise in youthful ED and low libido. For example, unhealthy lifestyles, such as poor diet leading to obesity, substance abuse and smoking (factors historically correlated with organic ED) have not changed proportionately, or have decreased, in the last 20 years. Obesity rates in U.S. men aged 20–40 increased only 4% between 1999 and 2008[45]; rates of illicit drug use among US citizens aged 12 or older have been relatively stable over the last 15 years;[46] and smoking rates for US adults declined from 25% in 1993 to 19% in 2011.[47]

Some suggest anxiety or depression could account for the sharp rise, yet these are not clear causes of ED. For example, one study found that anxiety increased sexual interest in 21% of subjects, while decreasing it in 28%.[48] As for depression and ED, studies suggest that ED leads to depression, rather than the reverse.[49] Even if more young men are anxious and depressed in 2017, could a small increase over 2001 explain a rapid multi-fold increase in youthful sexual difficulties, such as low sexual desire, difficulty orgasming, and ED? Perhaps the Canadian sexologists had no idea that at least 23 studies link porn use or porn addiction to sexual problems and lower brain activation to vanilla porn.[50]

I have seen two diverging patterns of recovery among those who describe their experiences in online self-reports. A few men bounce back in a relatively short time: about 2-3 weeks. Perhaps their difficulties are due to mild conditioning, excessive levels of masturbation (fuelled by internet porn), or a minor case of desensitisation (an addiction-related change we'll discuss in the next chapter).

The vast majority of guys need 2-6 months (or longer) to *fully* recover. Most 'long-rebooters' experience a variety of withdrawal symptoms, including the dreaded flatline. Typically, they are younger guys who started early on internet porn. I suspect that this unfortunate trend is the natural outcome of highly malleable adolescent brains[51] colliding with internet porn:

When I lost my virginity it really did not feel that good. I was bored actually. I lost the erection after maybe ten minutes. She wanted more sex, but I was done. The next time I tried to have sex with a woman was a disaster. I had an erection at first, but I lost it before I ever penetrated. Condom use was out of the question – not a hard enough erection.

*

My lowest point was when I couldn't get it up for my girlfriend (now ex-girlfriend) not once, but repeatedly over the course of our three-year relationship. We also never orgasmed from vaginal intercourse. I was visiting doctors; buying books on penis exercises; trying to change habits by masturbating to POV porn (instead of the extreme porn I was addicted to). She was totally supportive of me the entire time (this girl really loved me with all her heart). She even bought nice lingerie and made efforts to be the 'slut in the bedroom'. BUT even with that, I wasn't turned on because the porn I was into was much more extreme than that (rape, forced sex).

*

I never had a problem getting hard for porn, but when it came to the real thing, I started taking Cialis. Over time, I took more, and even then there were times when it would only partly work. WTH? Yet I could still get hard to porn.

In contrast, most older guys began their solo-sex careers with a catalogue, a magazine, a video, grainy TV porn, or amazingly (to today's young guys), their imagination. They also generally had *some* sex, or at least courtship, with a real partner before they fell under the spell of high-speed porn. Their 'real sex' brain pathways may temporarily be overwhelmed by hyperstimulating internet porn, but those pathways are still operational once the distraction of porn is removed:

(Married, 52) I have many decades of porn under my belt (so to speak). I have not looked at any porn or masturbated for nearly 4 weeks, and all I can say is the change is dramatic. This morning, I woke up with one of the most intense erections I have ever had. My wife noticed, and was nice enough to give me a wonderful BJ, all before 7 AM! Prior

to this, I cannot remember ever waking up like this, except when I was a teen. Plus, the feeling was very intense, much better than any porn release I remember.

*

(Married, age 50) I never thought I had ED. I managed to have sex with my wife. Boy, was I wrong! Since my recovery, my erections are way bigger, fuller and longer and the head is flared. My wife comments each time. I also remain erect even after orgasm, and think I could keep it up for a loooong time. My morning wood is also bigger and fuller. I really had ED and was too caught in my addiction to realize it. Keep in mind I am 50.

*

The reward for 4 months of no porn has been an improved sex life with my wife, and after nearly fifteen years of being together, that is a considerable reward. Hurrah for plain 'vanilla' sex. I seem to feel more than I used to.

Here's a guy in the middle, who started out on internet porn, but not high-speed:

I masturbated a lot from 13 and used porn from 14. Gradually, it took more to turn me on: bigger fantasies or harder porn, and I stopped getting hard without touching. During sex I would struggle to get an erection or keep it, especially for intercourse. Over the past 7 years I haven't held down a relationship, and the main reason for me has been this problem. Now, the good news: When I realized the cause, I immediately gave up porn. Over the last 6 weeks I held off masturbating as much as I possibly could. (My best record was 9 days!) It all paid off. I just went away with a girl for the weekend and it was the best ever. I still get pretty anxious from all the bad experiences over the years. But I just wanted to tell you all it can work, and it's well worth it!

What about women? Porn use also seems to affect the sexual responsiveness of some women:

For us girls a moderate porn-related 'ED' is tough to spot, but I feel it the same way as guys describe it. There is desire but no arousal. No throbbing, pulling, overwhelming, pleasurable sensation in the clitoris and the lower abdomen, only a kind of mental push

towards climax. And I too have PE [premature ejaculation], except it might more accurately be described as PO [premature orgasm]: orgasming while excitation is low, with the quality of the orgasm quite mediocre and unannounced except for a kind of anxiety-like tension localized in the genitals.

Unaccustomed premature ejaculation

Although rare when compared to ED or delayed ejaculation, heavy porn users do sometimes report recovery from this symptom after eliminating porn use. Premature ejaculation from porn use may seem counterintuitive. Two possible explanations come to mind. Perhaps a guy has trained his nervous system to ejaculate very quickly (or while partially erect). As this man described:

Masturbation/porn can cause PE especially when you start doing it young. You want to reach climax/orgasm quickly because of the fear of being caught. So you teach your mind that when you're hard your job is to cum quickly and not enjoy the interim sensation.

For others porn may become a powerful trigger due to a strong association between porn and ejaculation. This automatic, high arousal response is similar to Pavlov's dog salivating at the sound of a bell:

I am no longer experiencing the extreme PE that I had for many years prior to reboot. It is really a miracle, because I had always just assumed it was some genetic defect. I did not connect the dots as possibly being porn-induced. Prior to my re-boot, my erect penis was very sensitive (hyper-sensitive) making ejaculation embarrassingly easy (quick). My penis would get rock hard and stand at attention at 12 o'clock, the skin stretched tight like a snare drum. My penis was a fuelled rocket sitting on the launch pad. Countdown starts at 10 seconds, 9, 8, 7, 6,5,4,3,2 … 1, ORGASM. The words 'Sorry dear' became my motto. But today, 52 days into re-boot, my penis is no longer on the rocket launch pad. It stands at 10 o'clock. I have a softer, but bigger erection. Don't get me wrong. It is still very hard and capable of vaginal penetration, just more plastic, less rigid, less sensitive, and not as explosive. Most important to my relationship with my wife, I am able to last longer. The reboot is working very well on my porn-induced PE!

*

When you watch porn you become over-stimulated and ejaculation is one stroke away. I've spoken to numerous men older than me and have asked them how they last long. Many said that they last long naturally and don't watch porn or masturbate. My cousin who says he lasts 20-30 minutes has said he lasts longer when he doesn't watch porn or masturbate.

*

I was going out with my now ex-girlfriend for 2 years before we broke up. I never had any sexual problem (be it ED or PE). I wasn't addicted to porn, although I masturbated to it occasionally. After we broke up, I used porn regularly and started going to massage parlours with happy endings. After 6 months, I got back with the same girl, and I somewhat reduced the frequency of my other activities. The sex was awful with my girlfriend (or at least it was for her). I didn't have a problem with getting it up (except maybe a couple of times), but I couldn't last for over a minute. The relationship endured a year, during which, I didn't, not even once, make her orgasm from penetration. The same girl I was giving multiple orgasms 6 months earlier.

For others, PE may be related to a history of forcing orgasms with weak erections:

I would force myself to ejaculate in the morning before school, and several times after. I wasn't even horny or hard, merely compelled by some urge to keep forcing myself to cum. My mechanistic porn habits have taken away all sensuality from the act of orgasm, turning it into a short spurt and muscle memory twitch of a climax. If you have porn-induced PE consider the new behaviours, feelings and sensations that came with its onset. Before, orgasms were absolutely phenomenal (my f--king knees would literally shake), but now I cum with a mechanical twitch and no sort of real gratitude toward the act (and that is including with women). If feels different and lame.

Alarming porn fetish tastes

Once upon a time, men could trust their penises to tell them everything they needed to know about their sexual tastes or orientation. That was before readily available porn videos.

Brains are plastic. The truth is we are always training our brains – with or without our conscious participation. It's clear from countless reports that it's not uncommon for porn users to move from genre to genre, often arriving at places they find personally disturbing and confusing. What might be behind this phenomenon?

One possibility is boredom or habituation meeting the developing adolescent brain. Teens are thrill seeking and easily bored. They love novelty. The stranger the better. Many a young man has described masturbating with one hand while clicking through videos with the other hand. Lesbian porn grows boring, so he tries out incest porn. Novelty and anxiety ensue – and both increase sexual arousal. Before he knows it he has climaxed and a new association begins imprinting his sexual circuits.

Never before have developing adolescents been able to switch from genre to genre while masturbating. This casual practice may turn out to be a prime danger of today's porn:

> *I wasn't interested in any weird stuff before I started to watch internet porn. Just real girls of my age. Now, I like BBB, BBW, MILF, Tranny, Crossdresser, Fat, Skinny, and Teen. Once, I saw a few seconds of a bisexual video (one woman, two guys) and I started to feel that 'taboo' feeling, but I didn't give it a chance, did not masturbate to it, and changed the video. So, I don't watch bisexual videos and have no cravings for them. That's because I didn't give them a chance. But I gave a chance to every kind of porn I got into. If I had given granny porn a chance, I would like it now too.*

The tendency to escalate to more extreme porn is not confined to teens. In a pre-internet study, subjects were exposed either to common, nonviolent porn or to innocuous videos for one hour in each of six consecutive weeks. Two weeks later they were provided with an opportunity to watch videotapes in privacy, with a choice of G-rated, R-rated, and X-rated videos. The subjects who had watched pornography showed little interest in viewing nonviolent porn, electing instead to view bondage, sadomasochism and bestiality. This consumption preference was much more pronounced in males, though present to some extent in females.[52]

In an early review of relevant research, one of the study's authors commented that consumers of pornography are not likely to limit themselves to common porn when given the opportunity to consume material featuring less common sexual practices, including sadomasochistic and violent sexual behaviours. He also noted that after frequent exposure to pornography, 'Erections were less pronounced and more poorly maintained.' Viewing more extreme porn was thus appealing because it was still capable of producing sexual excitedness. However, the introduction of novel porn failed to return interest to initial levels. Pleasure reactions were flat or indicated disappointment and this lack of responsiveness lingered for weeks, but did gradually improve.[53]

In short, more than 25 years ago, there was already evidence that porn video viewers tended toward habituation, declining sexual responsiveness, a need for more extreme visual stimuli and dissatisfaction, but the evidence was largely ignored by sexual health professionals. When today's researchers finally thought to ask about this phenomenon in connection with high-speed porn use and limitless novelty, it turned out that half of their porn using male subjects reported escalating to online material that was not 'previously interesting to them or that they considered disgusting'. The researchers also found evidence of reduced erectile function and reduced overall sexual satisfaction.[54]

A related reason porn tastes can escalate is tolerance, which is a more lasting addiction process that drives a need for greater stimulation. I'll discuss it in the next chapter.

As we'll see, sexual novelty is a sure-fire way to bring your flagging member back to attention. If a new porn star won't do it, try gang rape or gore. No, you wouldn't rape or dismember anyone, but you may now need extreme material and underlying anxiety to get you going. As you may recall from the introduction, psychiatrist Norman Doidge also observed this process in his patients.

This phenomenon is so common, and evidence of recovery so reassuring, that I'll share a range of self-reports:

As my porn use progressed throughout college, I slowly fell prey to more and more hardcore shit, like really weird shit, that is now no longer turning me on when I think about it. This is one of the greatest feelings of all – to know that my fantasies are returning to those of a normal, earth-born and bred, human being.

*

I'm tired of hearing, 'You like what you like' from people. A lot of the things I look at I don't like. I just can't get off to the normal stuff anymore. I never thought I'd wank to girls pissing on each other – and now it doesn't do it for me anymore. Sexuality is tricky and I think we've only begun to look at the effects that internet porn has on human beings. All of us are test subjects and from what I've read over and over, people are noticing changes.

*

I can say with absolute certainty that the fantasies I had about rape, homicide and submission were never there before hardcore porn use from 18-22. When I stayed away from porn for 5 months all those fantasies and urges were gone. My natural sexual taste was vanilla again and still is. Thing with porn is you need harder and harder material, more taboo, more exciting and 'wrong' to actually be able to get off.

*

I never thought that I'd be able to have normal sex. I always thought that my brain was just hard-wired to only be turned on by my femdom fetish [female-domination porn that humiliates men], similar to the way a gay guy can only be turned on by cock and cannot appreciate sex with a woman. Little did I know that the fetish I thought was hard-wired, was simply the result of my porn-viewing habits. It was a hell of my own making. After 3 months of no porn, my latest sexual encounter has removed any doubt about the effectiveness of quitting.

*

I'm a 23-year old male in good physical condition. I started high-speed porn at 15, quickly escalating from normal porn to bukkake porn [repeated ejaculation on a female by many men], transgender porn, femdom porn, incest, etc. I didn't realize how much I was hurting myself until I lost my virginity at 20 and had problems achieving and maintaining an erection. It seriously hurt my self-confidence and made me fearful of sex. Similar results with other women. I kept increasing the frequency and length of porn sessions, and escalating to more disturbing fetishes. After a year, I tried to have sex with an attractive girl. I couldn't perform. I spiralled down a hole of despair. I started watching sissy hypno porn, and occasionally anal masturbation. I thought I might have turned gay, but gay porn never did it for me. I found NoFap and quit. After a few relapses, I made my 90-day mark. I have lost my cravings for all porn, especially extreme porn. At 87 days, I had my first date in ages. At 96 days, my first BJ [fellatio] since quitting. No problems at all, which is amazing because I used to get bored during BJs and lose my erection. And at 113 days, I had sex and performed better than ever, with a rock-hard erection the whole time. I feel like I've been given a second chance at life.

*

As any porn junkie knows, the more porn you watch, the more you need and the more hardcore porn you need to feel fully aroused. At my worst I was dabbling in bestiality, frequent incest scenes, or other hardcore porn. Actual vaginal sex was never too arousing for me. Oral or other types of non-vaginal sex were way more appealing. They made the woman just a pleasure-giving object. After months of 'mental detox', if you will, and multiple real-life partners, I've lost my fixation to alternative types of sex. I'm actually attracted to vaginas now. Sounds funny, doesn't it? I still enjoy other types of sex on occasion, but the intimacy of being inside of a woman is second-to-none. Seriously, it's way, way more sexy now. This is obviously a win-win in real life. And my urge to watch porn went from a constant roar to an occasional whimper. This is not an exaggeration.

Men have long believed that what arouses them to orgasm is ironclad evidence of their sexual orientation. Therefore, it can be especially distressing to escalate through shifting porn fetishes that ultimately cast doubt on sexual orientation. Yet such escalation to unexpected tastes is surprisingly common today, especially among young people who grew up dabbling in 'anything-goes' tube sites from an early age:

When I got internet back in my late teens I found many YouTube-like porn sites that categorized content by fetishes. At first my tastes were those of a normal teenage boy, but over the years my tastes shifted into aggressive content. Violent themes against women to be more specific, especially those anime/hentai videos with scenarios too vile to portray in real life. Eventually I got bored of that stuff, and in my 20s found new stuff. Within a year I had acquired many new fetishes, each changing within a shorter time frame than the one before it. I'm experimenting with quitting because my tastes are now making me really uncomfortable. They conflict with my sexuality.

Worse yet, there's a widespread idea online that internet porn is enabling users to 'discover their sexuality'. Some bold young explorers industriously seek out the hottest material they can find in the belief that it reveals who they are sexually. They don't realize that a boner isn't the only measure of a person's fundamental sexual proclivities.

For example, the addiction process itself can drive escalation to more extreme material, while making porn that used to seem hot appear confusingly unexciting. Also, anxiety-producing material pumps up sexual arousal.[55] As one researcher explained, a quickening pulse, dilating pupils and clammy skin – the body's reaction to adrenaline – can be mistaken for sexual attraction. 'We misinterpret our arousal. It is an error of presumption'.[56]

Sexual interests are conditionable (changeable).[57] In fact, multiple studies have successfully conditioned subjects to cues for erotic images in order to compare porn users' brain responses with controls.[58] Incidentally, sexual interests are different from fundamental sexual orientation.[59]

By following their erections from genre to genre, some young users migrate to content that they feel is at odds with their sexual identity:

I'm gay but porn can get me sexually interested in females. Well ... not breasts, but the other female parts become arousing. Porn is an overly charged erotic atmosphere. All inhibitions are down and the desire for arousal becomes dominant.

*

As the years slipped by gonzo simply wouldn't do it anymore. Recently, I actually looked at gay porn because I was bored. It was like, here I am, 28, and I've seen all the porn on the internet essentially, so I might as well look at gay porn. That moment the seed was planted, 'This is seriously f--ked, you need to stop this'. Of course I didn't then.

*

Reddit and the Empty Closets forum are full of people, gay/ bi/straight, who are completely lost and confused about their orientation and freaking out about why they want to suck cocks or watch weird stuff after use of porn. The highspeed generation's porn users are going online and asking for answers. On French forums it's the same. Thousands of people posting, and so many don't know why they developed penis fetishes or femdom addiction. The common factor is internet use (porn, chat, dating sites).

A 2016 study reports that it's now common for men to view porn inconsistent with their stated sexual identity. Heterosexual-identified men report viewing porn containing male same-sex behaviour (20.7%) and gay-identified men report viewing heterosexual behaviour in porn (55.0%).[60]

Sadly, ignorance of how common it is to escalate, paired with ignorance of how often quitting reverses porn tastes, can leave a porn consumer very anxious. When users become obsessed with sexual-orientation doubts they refer to it as SOCD or HOCD, that is, 'sexual-orientation (or homosexual) obsessive-compulsive disorder':

(Age 19) I seriously thought I was turning gay. My HOCD was so strong at that time, I was contemplating taking a dive off the nearest high-rise. I felt so depressed. I knew I loved girls and I can't love another dude, but why did I have ED? Why did I need transgender/gay stuff to shock me into arousal?

Let me emphasise that it is not only heterosexuals who become anxious about their sexual orientation due to escalation to new porn genres:

I myself had HOCD, in the sense that I feared myself to actually be heterosexual, since I eventually was exclusively turned on by straight and 'lesbian' porn. Yes, 'feared,' because my entire social identity was as a gay man and I am married to a man. If I went 'back to straight' – a move that nobody would ever believe and is more taboo nowadays than coming out as gay – I would be a social outcast. Finally, I realized that I had eroticized the fear itself.

Any form of OCD is potentially a serious medical disorder. Whether you are gay, straight or undecided, if you have these symptoms, seek help from a healthcare professional who thoroughly understands that OCD is a compulsion to check constantly to reassure yourself, and who won't jump to the conclusion that you are in denial about your sexuality.

I went to a psychiatrist. He confirmed I have OCD and he prescribed alprazolam (Xanax). Now, my symptoms of HOCD are very, very mild. I can think way clearer. It improved my appetite and I've had some of the best sleep of my life. Also, now I know I am not gay or bi, and my withdrawal from porn has become a lot easier because my anxiety has dropped. So, if someone asks you, 'How serious is porn addiction?' say that you know a guy who had to get on Xanax in order to make it through the withdrawal.

Loss of attraction to real partners

'Young Japanese men are growing indifferent or even averse to sex, while married couples are starting to have it even less,' reported the *Japan Times*, citing a 2010 poll that revealed a striking trend. More than 36% of men aged 16 to 19 had no interest in sex, more than double the 17.5% from 2008. Men between 20 and 24 showed a similar trend, jumping from 11.8% to 21.5%, while men between 45 and 49 leaped from 8.7% to 22.1%.[61] Japan isn't alone. In France, a 2008 survey found that 20 percent of 18 to 24-year old French men had no interest in sex.[62] Is today's porn a factor? A 2015 Italian study reported that 16% of high school males who use porn more than once per week report abnormally low libido, while 0% of those who do not use it report low libido.[63] Something peculiar is afoot, and it has invaded the States as well. The percentage of US high school students who are currently sexually active has decreased from 38% in 1991 to 30% in 2015.[64] Researchers suggested 'easy access

to pornography [and] more time spent interacting on a computer screen' as potential causes. In a 2016 study, young men who viewed a lot of porn were more likely to rely on it to become and remain aroused and more likely to use it during partnered sexual activities. In addition, they enjoyed sex less than men who use less porn.[65] In 2017, researchers reported that higher levels of porn use correlate with preferring porn over people for sexual excitement.[66]

It is not unusual for people on porn recovery forums to ask the question, 'Do you think I am asexual?' When asked if they masturbate, the answer is usually, 'Yes, 2-3 times a day to porn'. Are they asexual or just affected by their porn use? Its never-ending stimulation can provide a buzz long after real-life partners begin to pale.

I'm not asexual strictly speaking, as I still find women beautiful. But I'm no longer attracted to them, either sexually or romantically, though I consciously know they are attractive. Do you guys get that painful feeling when you look at a hot girl? You would like to be turned on but you just can't. It makes me angry.

*

(Age 18) Before starting porn at 15 I was EXTREMELY horny and would chase anything on 2 legs. I made out with girls and got insane boners. After porn ruined me, I was completely disinterested in girls and could never maintain an erection. At my young age I knew there was something definitely wrong with me because I'm supposed to be women-crazy like I used to be before porn. At 17 I began my reboot. Yesterday I successfully had sex with no ED drugs and my boner was amazing.

*

There's a new orb of light surrounding women. They're just beautiful, and cute, and playful. And yeah I love to look at them and admire their beauty and sexiness, because we're guys; that's what we do. But it's so much more than that. It's almost indescribable how stopping using porn has made me value women and the time I spend with them in so much more of a wholesome way. After years of fapping 5-12x per week to pornography,

sex was embarrassing. Not only was there not enough friction but it felt like the 'wrong' type of stimulation. Six months later I have no performance issues of any kind. Sex is now 20x more fulfilling than masturbation. It takes foreplay for me to reach my peak arousal now and my partners absolutely love that. I laugh at myself when I fap on occasion and am left a bit disappointed.

*

(Age 19) For years, I thought I used porn because I was horny. I thought that if I could get a girl to have sex with me, I wouldn't have to fap. But I recently passed up having sex with a woman I work with twice! And then I f--king went home and fapped while fantasising about having sex with her. The most messed up thing about this is that I didn't realize how f--ked up this was until yesterday. I mean, if I had actually been fapping because I wanted to have sex, I would have just gone through with it, right? I was in denial.

*

(Day 46) For the last three days I have felt that strong, natural sexual attraction to real women while out and about. I just naturally notice a woman's figure and it turns me on without me having to think about it. Duh, that's how it's supposed to work! Damn, it's amazing how porn screws you up! My penile sensitivity has been off the charts, too. I honestly don't remember ever feeling like this.

*

I'm known as the 'unrealistic-high-standards-on-chicks' guy among my friends, yet I hardly score. After 40 days, I'm approaching more girls than ever, not -only- for their looks, but the way they are and what they talk about. Before, girls weren't special. They were 'just ok'. My brain wanted unrealistic whores, and it's just now that I've realised how many years I wasted chasing fantasy relations instead of being happy with what life was giving me (which, in hindsight, were some of the nicest girls I've met).

*

In the past I noticed beauty, of course, but never FELT a DESIRE to be with a girl. I directed all my sex drive toward porn. Everything sexual for me WAS porn. I could never think about me, this guy with this cock, having real sex with a real girl. Now, I feel like sex is the most natural thing to do. 'Hell yeah it's possible for me to have sex. Hell yeah there's a lot of girls out there wanting to have it with me!' Suddenly, self-defeating thoughts seem so stupid and time-wasting. I finally feel what most males feel. And it's awesome.

Effects on romance

Relationships, too, are affected by porn use, which makes sense. Too much stimulation can interfere with what scientists call pair-bonding, or falling in love. When scientists jacked up pair-bonding animals on amphetamine, the naturally monogamous animals no longer formed a preference for one partner.[67] Artificial, abnormally intense stimulation hijacks their bonding machinery, leaving them just like regular (promiscuous) mammals – in which the brain circuits for lasting bonds are muted.

Research in humans also suggests that too much stimulation weakens pair bonds. According to a 2007 study, mere exposure to numerous sexy female images causes a man to devalue his real-life partner.[68] He rates her lower not only on attractiveness, but also on warmth and intelligence. Also, after porn consumption, subjects of both sexes report less satisfaction with their intimate partner – including the partner's affection, appearance, sexual curiosity and performance.[69] And both men and women assign increased importance to sex without emotional involvement.

There are now over 70 studies, most fairly recent, linking internet porn use (or problematic porn use) to sexual problems, lower arousal to sexual stimuli and reduced sexual and relationship satisfaction.[70]51 In fact, in men, higher porn consumption is consistently associated with reduced enjoyment of sexual intimacy with a partner.

(Day 125) I am in a long-term relationship, and I can vouch for the fact that quitting helped our sex life. A lot. I had no ED or PE or any other kind of sex-related problems, but compared to what we have now, our sex life while I was fapping was .... dull. *Now it is*

anything but dull, and both of us have stronger libidos than before. I am not exactly sure how – or if – my quitting affected her libido, but she sure is much more interested in sex now :).

*

(Age 50) Over the years, I suggested to my wife various activities straight out of porn stories. She was okay with some of them, but it never satisfied at all. Although we had a decent sex life relative to most people our age, I was always comparing the porn scenarios with my real life and real wife and feeling dissatisfied. Now, things are shifting. During intercourse last night, I felt suddenly very intimate, almost scarily intimate, deep contact I have never experienced before. It felt kind of shocking to me. It was wonderful in a way I can't describe, but I am in a kind of awe over it.

*

(Age 19) Even though I watched porn I was never really one to want sex. TWO guys managed to grab my interest. However, I think porn/masturbation was suppressing my longing to be with either of them. Since quitting, I suddenly had this intense realization that I really like those two, and I could see myself completely happy in a committed relationship with either. Suddenly it felt like...my heart was reaching out for them. Instead of daydreaming, my body was like, 'Let's go make this happen in real life.' All of a sudden I felt this huge wave of some weird attraction-type energy surge over me. [He soon began a relationship with one of the men.]

*

(Age 30) In the past, sex wasn't emotional. On some level it was like nobody else was there because I was in my own head the whole time for one reason or another (fantasising, DE issues, etc...). Girlfriends during my mid 20's to early 30's just didn't arouse me anywhere close to what high-speed porn offered, no matter how good they looked. I didn't recognize these things at the time of course, but since beginning this journey 4 months ago, I can honestly say I'm shocked how good sex can be with your girlfriend when you eliminate the constant, steady pattern of porn use.

*

(200 days) I now have an undeniable sex drive. I want my wife more than ever. If a long time passes without sex, I feel this thing called 'sexual tension', which is apparently real. And let me tell you – when you get to this point, you really won't care about whatever super-specific porno fetishes you thought were the only thing you could get off to, because just the word WOMAN (or man or whatever) will make you feel urges.

*

My sexual desire has never been higher, and I'm more observant towards women who could become good girlfriends and eventually good mothers. It's not entirely about their beauty anymore.

*

Before realizing that porn was the problem, I used to think I needed to get healthier fantasies. Now, almost 8 months after quitting porn, I'm finding that the fantasies I used to have don't appeal to me anymore...at all. My wife and I both enjoy sex much, much more when there is no fantasy involved. I'm now able to make love to her without erectile issues, face-to-face with eye contact.

Social anxiety, self-esteem

As users manage to abstain from porn, their desire to connect with others generally surges. Often, so does their self-esteem, their ability to look others in the eye, their sense of humour, their optimism, their attractiveness to potential mates, and so forth. Even those formerly suffering from severe social anxiety often explore new avenues for social contact: smiling and joking with work colleagues, online dating, meditation groups, joining clubs, nightspots, and so forth. In some cases it takes months, but for others the shift is so rapid that it catches them by surprise.

YBOP wasn't alone in chronicling this unexpected connection. In his famous TED talk "The Demise of Guys", well known psychologist Phillip Zimbardo noted that 'arousal addiction' (porn, video games) is a major factor in the increase in social awkwardness and anxiety among digital natives.

Zimbardo's hypothesis is that excessive screen time can interfere with development of normal social skills. Already, ten studies link porn use to anxiety, with an eleventh linking it to shyness.[71] However, this doesn't explain the increase in confidence and extraversion after quitting, or why some guys improve so quickly.

In *The Brain That Changes Itself*, psychiatrist Norman Doidge suggests that the intense stimulation of today's porn hijacks and rewires 'brain real estate' that would otherwise be devoted to making social ties rewarding. Real people become less rewarding; fake people become far more enticing. Perhaps removing porn re-opens the space for natural rewards such as friends and partners. I explore this further in the next chapter.

> *Before porn, I had a lot of friends, a couple of girlfriends, and I feltlike I was on the top of the world. There was nothing that could bring me down. I felt like I had my own way to react to everything that could happen. Then I got a new computer... After a year or two I found myself in REALLY deep social anxiety, combined with too much pot and nothing interesting to do with my life.*

*

> *I'm not your generic self-diagnosed socially awkward penguin. I've been to a psychiatrist, diagnosed with moderate to severe social-anxiety and was put on medication. I know about the adrenaline rush you get when a stranger gets near you, the almost heart attack you feel when you try to talk during a class or a meeting (as if you ever do), the long lonely walks you take not to deal with strangers, the unfounded shame when you look another person in the eye, the huge wall you put between strangers. Sweating, trembling, panic attacks, self hate, suicidal impulses, I've been through it all. I've been attempting quitting for two years now and this is the longest I've abstained. I no longer experience the 'torture' I described above. No I'm not a new person, not a social butterfly. I'm still*

myself but I'm free of the shackles we call social phobia. In this past two years I've made more connections, hit on more women, made more friends than I did in my first 25 years. I feel content and comfortable in my own skin, and the wall I put between myself and other people has crumbled.

*

Social interaction. I was completely afraid of it and incapable of it 50 days ago. In the past week or so, I have interacted incredibly smoothly and effortlessly with people with whom I would have been unable to interact while using. I used to be unable to look people in the eyes. I used to purposefully hide from people I knew in public so as to avoid awkward conversation. I wasn't able to be invested in the conversation. Women, even those I knew personally, would intimidate me. I would fantasize throughout the day about being able to interact like a normal human... All of this is now changing before my eyes in a most drastic way. I can interact with confidence; be myself. I can hold an unbreakable gaze into other people's eyes. I am actually part of the conversation, as opposed to being aloof and thinking about leaving it.

*

New people I meet tell me they like my confidence and they think I'm a good speaker, compliments I would've never expected to hear just a few months ago.

*

My interactions with females are completely transformed. It seems there is some unconscious recognition that you have more power or something. It's hard to explain. Females are complimenting me on my looks and body. I can read people's body language better. People cannot intimidate me as before. Their anger just bounces off me, and I stay in a serene state.

Inability to concentrate

Those who reboot commonly report that they have 'better concentration', 'no more brain fog', 'clearer thinking' and 'improved memory'. Not surprisingly, researchers report that porn (or erotica) viewing is associated with concentration problems,[72] working memory interference,[73] poorer executive function,[74] and reduced academic performance.[75] Several research groups have now linked porn use with impulsiveness or the inability to delay gratification.[76] This has ominous implications for meeting life goals while using porn. Such results align with a finding that moderate porn use, even by non-addicts, correlates with shrunken grey matter in regions of the brain associated with cognitive function.[77]

When I was [using internet porn] I had brain fog or a constant hung-over-like feeling, which made it hard for me to concentrate, talk to people or just do my everyday tasks. After 7-10 days without porn this feeling went away. My mind became very clear, thoughts easily controllable, and I became much more relaxed in general.

*

I am 34 and went on Adderall for the first time a few months ago. 2 months after quitting porn, I really don't even need it anymore. Some of the benefits I have experienced: I can retain and remember information a lot better. I remember events in my past life a lot better. I am not irritable, and am more focused. I can execute tasks a lot faster.

*

Another result: my writing is much better. I don't mean handwriting (though that got better too). I mean word choice, sentence structure, etc. During my first year of graduate school (which I just finished), writing was a real chore. Now, after no-porn, it's a pleasure. So easy and free. I have more words at my disposal, probably because my memory has improved in general.

*

Memory – I always had a good one, but quitting put it through the roof. I could enter a room of 15 people and learn + recall specifically all their phone numbers in under 5 min. Marks perfect. Social anxiety and BS negative thinking –> out with the trash.

*

For those of you who are in uni, NoFap is a miracle for the brain. Before, I used to have to force myself to concentrate in class and would still end up 'zoning out'. Now, I can concentrate in a 3-hour lecture with almost no issues.

Depression and Other Distress

Scientists now view depression as a condition of low energy and little motivation. Recent research confirmed that the 'go get it!' neurochemical dopamine is the main player.[78] In fact, impaired/restored dopamine signalling may be behind many of the symptoms/improvements reported by recovering users. Again, more in the next chapter:

I'm finding I experience depression and feelings of worthlessness far less often. I'm able to get up more easily in the morning and find the motivation to do the bloody dishes more often before going to bed.

*

I'm happier. Much, much happier. I typically suffer from SAD and was diagnosed with minor clinical depression a few years back, but this autumn/winter I'm feeling great. I have more energy.

*

As a man with genetic depression, being porn free has done more for me than any drugs I have ever had to take. It is as if this makes me more alert, attentive, and happier than Wellbutrin, Zoloft or the other drugs I was cycled through.

*

My life long (so I thought) anxiety, depression and mental issues have seemingly dissipated and retreated from the roaring lion within. I have been on Lexapro for the past 2 years and was able to taper off completely. Over this 90 days I landed my highest paying and most rewarding job thus far, connected much better with friends and family and have had a surplus of energy and vigor that I never realized was possible. More money is in my bank account because of my new found self-control. I notice more respect from others because it seems as if they intuitively know that I respect myself.

*

Quitting isn't a cure all for your life problems – but it's the foundation, a ploughed field in which you can sow seeds for a new future that isn't bedevilled by the secrecy and shame that comes with falling into the seemingly inescapable pit of porn-related despair that so many of us know. A life of hope and strength – not jizzy tissues, jealousy, bitterness, self-hatred, resentment and unfulfilled dreams.

Almost a dozen studies now correlate porn use or problematic porn use with depression.[79] In those studies (or others) associated links with porn use also included psychoticism, paranoid thinking, stress,[80] psychosomatic symptoms[81] and narcissism.[82]

In the light of this vast, informal experiment, it seems clear that the widely publicised view that pornography, specifically online pornography, is harmless should be reconsidered as a matter of urgency. We can't be sure that the thousands of people describing their recovery from excessive porn use are mistaken. Indeed, the research so far published overwhelmingly corroborates their experiences.

As we'll see next, it is quite plausible that the symptoms they describe are real, that online pornography use causes them, and that behavioural change can bring significant benefits. In any case, porn users suffering from the kinds of symptoms outlined above have little to lose from cutting out internet porn for a few months to see if their symptoms resolve.

2

WANTING RUN AMOK

Choice is a subtle form of disease. Don DeLillo, *Running Dog*

Ever heard of the Coolidge effect? It's a graphic example of how unrelentingly sexual novelty can drive behaviour. The effect shows up in mammals ranging from rams to rats, and here's how it works: Drop a male rat into a cage with a receptive female rat. First, you see a frenzy of copulation. Then, progressively, the male tires of that particular female. Even if she wants more, he has had enough.

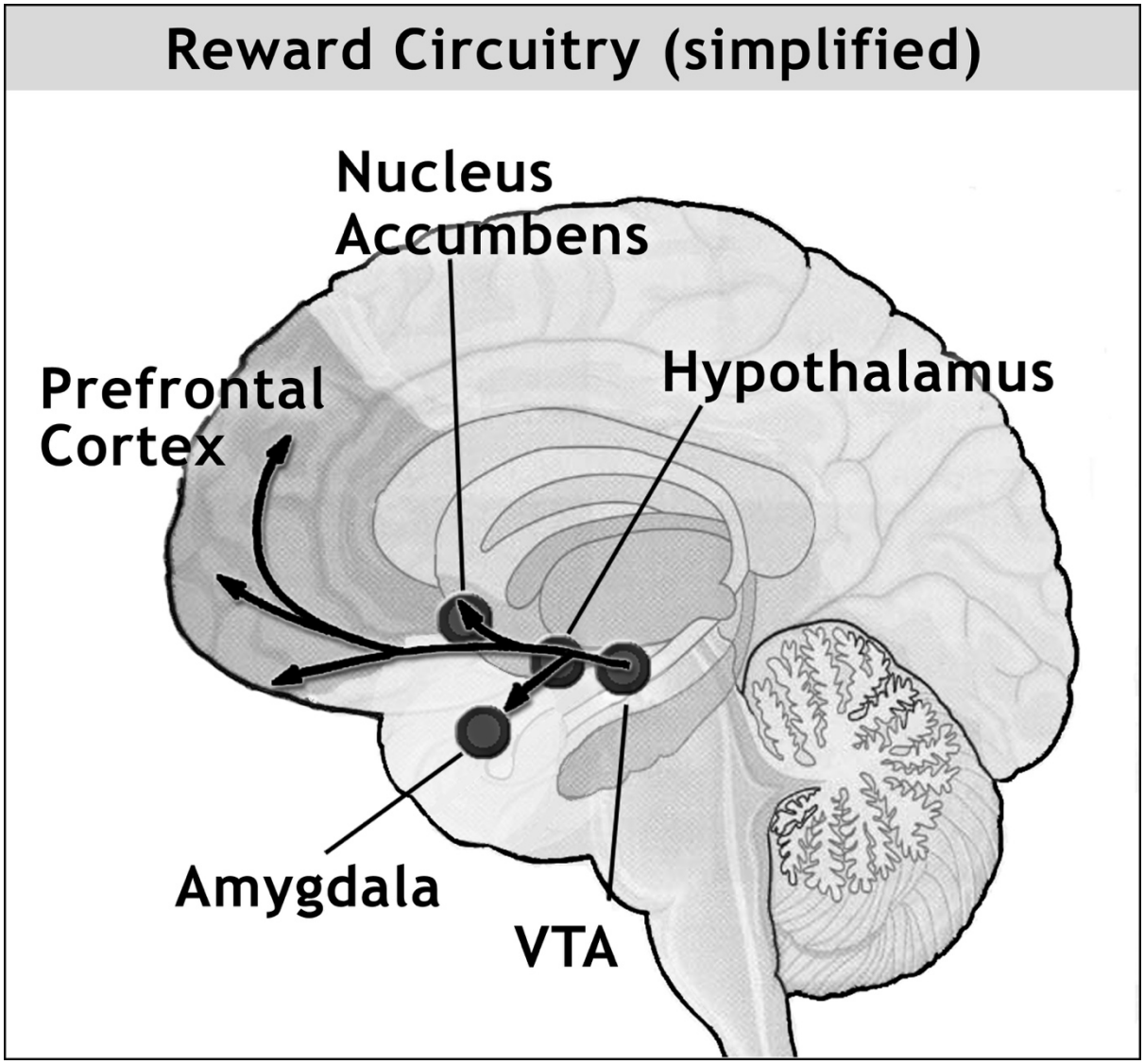
However, replace the original female with a fresh one, and the male immediately revives and gallantly struggles to fertilize her. You can repeat this process with fresh females until he is completely wiped out. Reproduction, after all, is genes' top priority. Just ask the male antechinus, a mouse-like creature from Australia, which engages in such a furious mating frenzy that it destroys its own immune system and drops dead.

Obviously, human mating is generally more complex. For one thing we're among the peculiar three to five percent of mammal species with the capacity for long-term bonds. Yet sexual novelty can enthral us too.

The Coolidge effect itself gets its name from US President Calvin Coolidge. He and his wife were once touring a farm. While the president was elsewhere, the farmer proudly showed Mrs. Coolidge a rooster that could copulate with hens all day long, day after day. Mrs. Coolidge suggested that the farmer tell that to Mr. Coolidge, which he did. The president thought for a moment and then enquired, 'With the same hen?' 'No, sir,' replied the farmer. 'Tell that to Mrs. Coolidge,' retorted the president.

An appreciation for a fine novel partner helps propel internet porn use. At its most fundamental level, this impulse is evolution's way of making sure no female goes unfertilized. What powers the lure of novelty at the physical level?

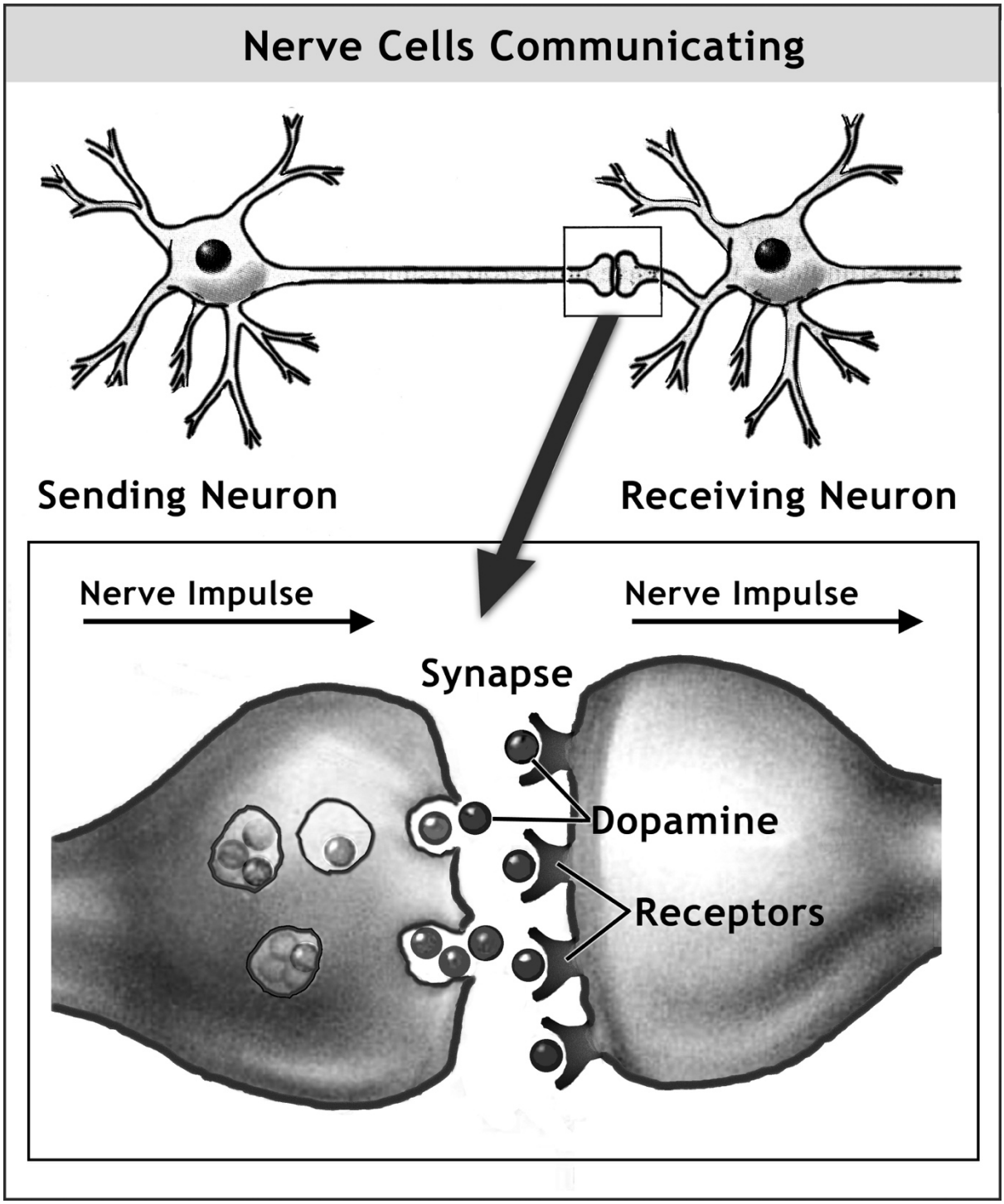
Primitive circuits in the brain govern emotions, drives, impulses, and subconscious decision-making. They do their jobs so efficiently that evolution hasn't seen the need to change them much since long before humans were human.[83] The desire and motivation to pursue sex arise largely from the neurochemical called dopamine.[84] Dopamine amps up the centrepiece of a primitive part of the brain known as the reward circuitry. It's where you experience cravings and pleasure and where you get addicted.



This ancient reward circuitry compels you to do things that further your survival and pass on your genes. At the top of our human reward list are food, sex, love, friendship, and novelty.[85] These are called 'natural rewards' as contrasted with addictive chemicals (which can hijack this same circuitry).

The evolutionary purpose of dopamine is to motivate you to do what serves your genes.[86] The bigger the squirt the more you want or even crave something. No dopamine and you just ignore it. High-calorie chocolate cake and ice cream – a big blast. Celery – not so much. Dopamine surges are the barometer by which you determine the potential value of any experience. They tell you what to approach or avoid, and where to put your attention. Further, dopamine tells you what to remember by helping to rewire your brain via new or stronger nerve connections.[87] Sexual stimulation and orgasm add up to the biggest natural blast of dopamine and opioids available to your reward circuitry.

Although dopamine is sometimes referred to as the 'pleasure molecule', it is actually about seeking and searching[88] for pleasure, *not* pleasure itself. Thus dopamine rises with anticipation.[89] It's your motivation and drive to pursue potential pleasure or long term goals.[90] It works in the synapses of nerve cells by attaching to receptors to stimulate electrical impulses, as pictured here.



The final reward, or what we experience as feelings of pleasure, involves the release of endogenous opioids. These morphine-like chemicals also bind to receptors within the reward circuit. The pleasure of climax appears to arise from a huge release of opioids. An example of a less intense opioid experience would be the ahhh feelings experienced as you savour your favourite dessert or drink cold water on a hot sunny day. In contrast, squirts of dopamine urge you to finish with an orgasm, spoon up the dessert, or find a fountain.

Think of dopamine as *wanting* and opioids as *liking*, although these functions are not so simplistically separated in the brain.[91] As psychologist Susan Weinschenk explained,[92] 'dopamine causes us to want, desire, seek out, and search'. But 'the dopamine system is stronger than the opioid system. We seek more than we are satisfied. ... Seeking is more likely to keep us alive than sitting around in a satisfied stupor.'

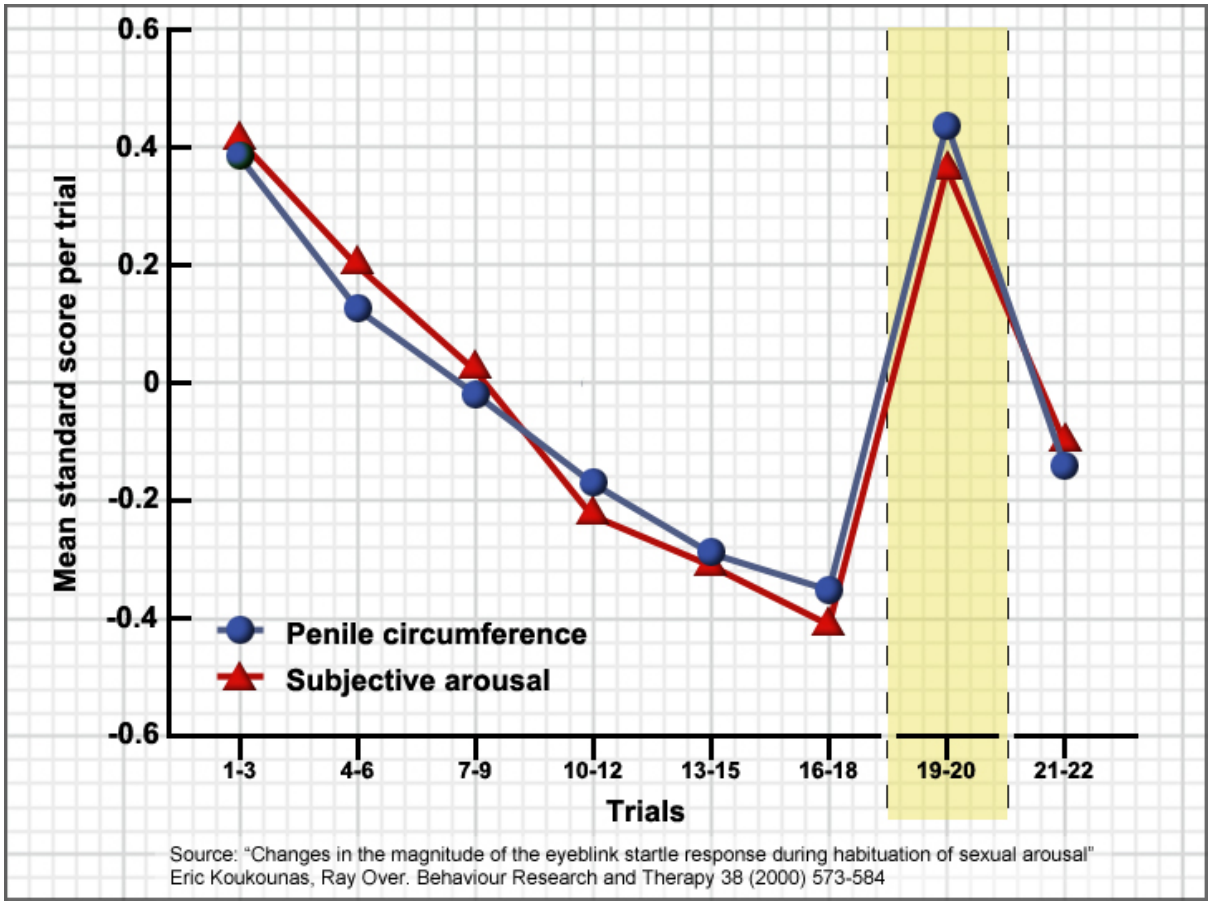
One of the key imbalances with chronic overstimulation, and ultimately addiction, is that wanting and cravings increase while pleasure or liking decrease. Addicts want 'it' more, but gradually like 'it' less. Addiction may be thought of as *wanting run amok*.[93]

Novelty, Novelty, More Novelty

Dopamine surges for novelty.[94] A new vehicle, just-released film, the latest device…we all pursue dopamine. The thrill fades away as dopamine plummets. In the example above, the rat's reward circuitry is squirting less and less dopamine with respect to the current female, but produces a big dopamine surge for a new female.

Does this sound familiar? When Australian researchers displayed the same erotic film repeatedly, test subjects' penises and subjective reports both revealed a progressive decrease in sexual arousal.[95] The 'same old same old' just gets boring. Habituation indicates declining dopamine. After 18 viewings - just as the test subjects were nodding off - researchers introduced novel erotica for the 19th and 20th viewings (see graph below). Bingo! The subjects and their penises sprang to attention. (Yes, women showed similar effects.[96]) Men also ejaculate greater volume and more motile sperm, and they do it more quickly, when they view a novel porn star.[97] It seems your primitive brain perceives it is impregnating real people when you tug the slug to pixels.

Internet porn is especially enticing because novelty is always just a click away. It could be a novel 'mate', unusual scene, strange sexual act, or – you fill in the blank. Popular porn tube sites present dozens of different clips and genres on every page. They engross us with inexhaustible sexual novelty.



With multiple tabs open, and clicking for hours, you can 'experience' more novel sex partners every ten minutes than your hunter-gatherer ancestors experienced in a lifetime. Of course the reality is different. What feels like a cornucopia of riches is time spent in front of a screen, seeking something that exists elsewhere.

> *I always opened several windows in my browser, each one with many, many tabs. The main thing that arouses me is novelty. New faces, new bodies, new 'choices'. I very rarely even watched a whole porn scene, and can't remember when I saw an entire movie. Too boring. I always wanted NEW stuff.*

Supernormal Stimulus

Erotic words, pictures and videos have been around a long time – as has the neurochemical rush from novel mates. So what makes today's porn uniquely compelling? Not just its unending novelty. Dopamine fires up for other emotions and stimuli too, all of which often feature prominently in internet porn:

- Surprise,[98] shock (What *isn't* shocking in today's porn?)

- Violation of expectations[99] ('This genre is unlike anything I've ever seen.')
- Anxiety[100] (Porn that's inconsistent with your values or sexuality.)

- Seeking[101] and searching (Some scientists call the reward circuit the 'seeking circuit'.)

Would anyone call *Playboy* or softcore videos 'shocking' or 'anxiety-producing'? Would either violate the expectations of a computer-literate boy over the age of 13? Neither compares with a multi-tab Google porn prowl. Many of these same emotional states (anxiety, shame, shock, surprise) not only elevate dopamine, but also boost stress hormones and neurotransmitters (norepinephrine, epinephrine, cortisol). These stress neurochemicals increase excitement,[102] amplifying dopamine's already powerful effects. Over time a porn user's brain can mistake feelings of anxiety[103] or riskiness for feelings of sexual arousal.[104] This may explain why some porn users escalate into ever more extreme porn. They need that extra neurochemical jolt to orgasm.

In fact, internet porn looks very much like what scientists call a *supernormal stimulus*.[105] Years ago, Nobel laureate Nikolaas Tinbergen discovered that birds, butterflies, and other animals could be duped into preferring fake eggs and mates. Female birds, for example, struggled to sit on Tinbergen's larger-than-life, vividly spotted plaster eggs while their own pale, dappled eggs perished untended. Male jewel beetles will ignore real mates in favour of futile efforts to copulate with the dimpled brown bottoms of beer bottles.[106]To a beetle, a beer bottle looks like the hottest female ever.

In other words, instead of the instinctive response stopping at a 'sweet spot' where it doesn't lure the animal out of the mating game entirely, this innate programming continues to trigger enthusiastic responses to unrealistic, synthetic stimuli. Tinbergen dubbed such deceptions 'supranormal stimuli,' now often referred to as 'supernormal stimuli'. Supernormal stimuli are exaggerated versions of normal stimuli that amplify qualities we find especially compelling (such as sexual novelty). Interestingly, although it's unlikely a monkey would

choose images over real mates, monkeys 'paid' (passed up juice rewards) to view images of female monkey bottoms.[107] Perhaps it's not surprising that today's porn can hijack our instincts.

When we make an artificial supernormal stimulus our top priority it's because it has triggered a bigger blast of dopamine in our brain's reward circuit than its natural counterpart. For most users, yesteryear's porn magazines couldn't compete with real partners. A *Playboy* centrefold did not duplicate the other qualities earlier porn users had learned to associate with real partners: eye contact, touch, scent, the thrill of flirting and dancing, foreplay, sex and so forth.

Today's internet porn, however, is laced with supernormal stimulation, and most users now consume it before they begin to lay down a sexual map with a real person. First, porn offers endless novel hotties at a swipe. Research confirms that anticipation of reward and novelty amplify one another to increase excitement and rewire the reward circuitry of the brain.[108] In the midst of his third masturbation session of the night a porn user can switch to a new genre to boost waning sexual arousal and dwindling dopamine.

Second, internet porn offers countless artificially enhanced breasts and drug-sustained gargantuan penises, exaggerated grunts of desire, pile-driving thrusts, double or triple penetration, gang-bangs and other impractical, but riveting scenarios.

Third, for most people, static images cannot compare with today's hi-def videos of people engaged in intense sex,[109] let alone virtual reality (VR) episodes. With stills of naked bunnies all you had was your own imagination. You always knew what was going to happen next, which wasn't much in the case of a pre-internet 13-year old. In contrast, an endless stream of 'I can't believe what I just saw' videos constantly violates your expectations.[110] Keep in mind also, that humans evolved to learn by watching others doing things, so videos are powerful 'how to' lessons.

With science-fiction weirdness that would have made Tinbergen say, 'I told you so', today's porn users often find digital erotica more stimulating than real partners. Users might not want to spend hours hunched in front of a computer staring and compulsively clicking. They might

prefer to spend time socialising with friends and meeting potential partners. Yet reality struggles to compete at the level of the brain's response, especially considering the uncertainties and reversals of social interaction. As Noah Church put it in his memoir *Wack: Addicted to Internet Porn*, 'it's not that I didn't want real sex, it's just that it was so much harder and more confusing to pursue than pornography.' And this finds an echo in numerous first person accounts:

> *I went through a period of being single where there were very few dating opportunities, and I began to masturbate frequently with porn. I was amazed at how quickly I got sucked in. I began losing days of work surfing porn sites. I didn't fully appreciate what was happening to me until I was in bed with a woman and caught myself furiously trying to recall porn imagery in order to get hard. I did not imagine that could happen to me. Fortunately, I had a long foundation of healthy sex before porn and I recognized what was going on. After I quit, I started getting laid again, and often. And shortly after that I met my wife.*

These days, there's no end of supernormal stimulation in sight. Competing with robots[111] and sex toys synchronized with porn[112] or other computer users,[113] VR may be the future of online porn. Scientists studying its effects said:

> *We found that for most people the potential of a VR porn experience opened the doors to an apparently 'perfect' sexual experience – a scenario which in the real world no-one could live up to. For others it meant pushing the boundaries, often with highly explicit and violent imagery, and we know from current research into pornography that exposure to this content has the potential to become addictive and more extreme over time.*[114]

Put simply, danger lurks when something:

- registers as an especially 'valuable', that is, exaggerated version of a thing that humans evolved to find irresistible,
- is available conveniently in limitless supply not found in nature,
- comes in lots of varieties (abundant novelty),
- and we chronically over consume it.

Cheap, plentiful junk food fits this model and is universally recognized as a supernormal stimulus. You can slam down a 32-ounce soft drink and a bag of salty nibbles without much thought, but just try to consume their caloric equivalent in dried venison and boiled roots!

Similarly, viewers routinely spend hours surfing porn galleries for the right video to finish, keeping dopamine elevated for abnormally long periods. Try to envision a hunter-gatherer spending hours masturbating to the same stick-figure on a cave wall. Didn't happen.

With streaming tube sites a user can control his dopamine (and thus his sexual arousal) with a click or a finger swipe. As soon as dopamine begins to drop, he can click to a new clip or an unexplored porn genre to boost its waning levels. This couldn't be done with earlier porn. Not magazines, not VHS tapes, not even with the internet before tube sites.

Porn poses unique risks beyond supernormal stimulation. First, it's easy to access, available 24/7, free and private. Second, most users start watching porn by puberty. Their brains are at their peak of dopamine sensitivity, plasticity *and* vulnerability to addiction and inadvertent rewiring of sexual tastes.

Finally, there are limits on food consumption: stomach capacity and the natural aversion that kicks in when we can't face one more bite of something. In contrast, there are *no* physical limits on internet porn consumption, other than the need for sleep and bathroom breaks. A user can edge (masturbate without climaxing) to porn for hours without triggering feelings of satiation or aversion.

Bingeing on porn feels like a promise of pleasure, but recall that the message of dopamine isn't 'satisfaction'. It's, 'keep going, satisfaction is j-u-s-t around the corner':

> *I would arouse myself close to orgasm then stop, keep watching porn, and stay at medium levels, always edging. I was more concerned with watching the porn than getting to orgasm. Porn had me locked in focus until eventually I was just exhausted and orgasmed out of surrender.*

Sexual arousal and addictive drugs share neurological mechanisms

Interestingly, research on rats shows that methamphetamine and cocaine hijack the *same reward-centre nerve cells* that evolved for sexual conditioning.[115] Some of those same researchers also found that sex with ejaculation shrinks (for a week at least) the cells that pump dopamine through the reward circuit. These same dopamine-producing nerve cells shrink with heroin addiction.[116]

Put simply, addictive drugs like meth and heroin are compelling because they hijack the precise mechanisms that evolved for sex. Other pleasures also activate the reward centre, but their associated nerve cells don't overlap as completely with sex. Therefore non-sexual natural rewards feel different and less compelling.

Sexual arousal and orgasm induce higher levels of dopamine and opioids than any other natural reward. Rat studies reveal that the dopamine levels occurring with sexual arousal equal those induced by the administration of morphine or nicotine.

Below our conscious awareness lie other distinctions. Both sex[117] and drug use[118] also lead to the accumulation of DeltaFosB, a protein that activates genes involved with addiction. The molecular changes it generates are nearly identical for both sexual conditioning *and* chronic use of drugs.[119] Whether its sex or drugs of abuse, high levels of DeltaFosB rewire the brain to crave 'IT', whatever 'IT' is. Thus, addictive drugs co-opt the same learning mechanisms that evolved to make us desire sexual activity.

While too complex to elucidate here, multiple temporary neurological and hormonal changes occur with orgasm[120] that do not occur with any other natural rewards. These include decreased brain androgen receptors, increased oestrogen receptors, increased hypothalamic enkephalins, and increased prolactin. They also help our brain distinguish munching on chips from an orgasm. Dopamine is only one element in a complex system that underpins our experience of desire, pleasure, orgasm, and post-coital tenderness or sadness.

Thus, familiar talking points such as this actual comment from an academic sexologist fall apart: 'Well, lots of activities raise dopamine, so internet porn is no more addictive than watching sunsets or playing golf.' Not to be outdone, a frequently quoted anti-porn addiction psychologist claims that watching hard-core porn is no different neurologically than viewing images of cute puppies. These baseless claims deceive the public into the false belief that all natural rewards are equally innocuous, biologically and psychologically.

Incidentally, the claim that watching sunsets is no different that viewing porn was actually tested and debunked in a 2000 brain scan study.[121] Cocaine addicts and healthy controls viewed films of: 1) explicit sexual content, 2) outdoor nature scenes, and 3) individuals smoking crack cocaine. The results: cocaine addicts had nearly identical brain activation patterns when viewing both porn and a crack pipe. However, for all subjects brain activation patterns when viewing nature scenes were completely different from the porn-viewing patterns. All subjects had the same brain activation patterns for porn. The important takeaway is that drugs can activate the 'sex' neurons and trigger a buzz *without* actual sex. So can internet porn. Golf and sunsets cannot.

Since orgasm is our most powerful natural reinforcer, and reproduction our genes' top job, masturbating to streaming porn videos has no neurological equal. I say this because even people who agree that porn use can cause problems or even addiction, sometimes erroneously compare it to addictive drugs or videogames. Certainly, behavioural and substance addictions share some brain changes. Yet such analogies ignore the elephant in the room: Our brain circuits for sex are particularly vulnerable during adolescence (and somewhat vulnerable lifelong).

Teenagers aren't playing video games to learn how to become professional assassins. Yet teens today watch real people having real sex during a time when the brain is primed to learn, and remember, everything sexual. Alcohol, cocaine and first-person shooters can all elevate reward centre dopamine (requisite for addiction-related brain changes), but unlike internet porn, none has the power to sculpt our extensive sex-and-reproduction brain circuitry or alter our sexual tastes.

Overriding Normal Satisfaction

A ‘binge mechanism’ is an evolutionary advantage in situations where survival is furthered by overriding satiation mechanisms (‘I’m full’, ‘I’m done’).[122] Excess consumption of food or sex signals the brain that you have hit the evolutionary jackpot,[123] and a powerful neurochemical incentive to grab more kicks in. Think of wolves, which need to stow away up to twenty pounds of a single kill at one go. Or mating season,[124] when there is a harem to impregnate. Such opportunities are rare, pass quickly, and need to be seized.

Now, however, the internet offers endless ‘mating opportunities’, which a primitive part of the brain perceives as valuable because they are so arousing. As any good mammal would, viewers attempt to spread their genes far and wide, but there’s no end to a porn viewer’s mating season. He can keep going indefinitely by pumping up his dopamine with whatever it takes.

Click, click, edge, click, edge, click, click. Sessions can last for hours, day in and day out, sometimes sending the viewer’s evolved ‘binge mechanism’ into overdrive. Evolution has not prepared the brain for this kind of nonstop stimulation.

What’s a brain to do when it has unlimited access to a super-stimulating reward it never evolved to handle? Some brains adapt – and not in a good way. At first, using porn and masturbating to orgasm resolves sexual tension and registers as satisfying. But if you chronically over stimulate yourself, your brain may start to work against you.

Both Sexual Conditioning and Addiction Begin with Sensitisation

You have already learned that sexual arousal and addictive drugs (meth and cocaine) stimulate the same group of reward system nerve cells while triggering similar mechanisms that leave the user wanting more. So it’s not surprising that sexual conditioning (‘this is what turns me on’) and cravings to use drugs involve the same brain change: *sensitisation*.

Spikes of dopamine set in motion the neurochemical events creating sensitisation,[125] but the actual molecular switch that produces sensitisation is the protein DeltaFosB.[126] Dopamine surges trigger DeltaFosB’s production. It then accumulates slowly in the reward circuitry in

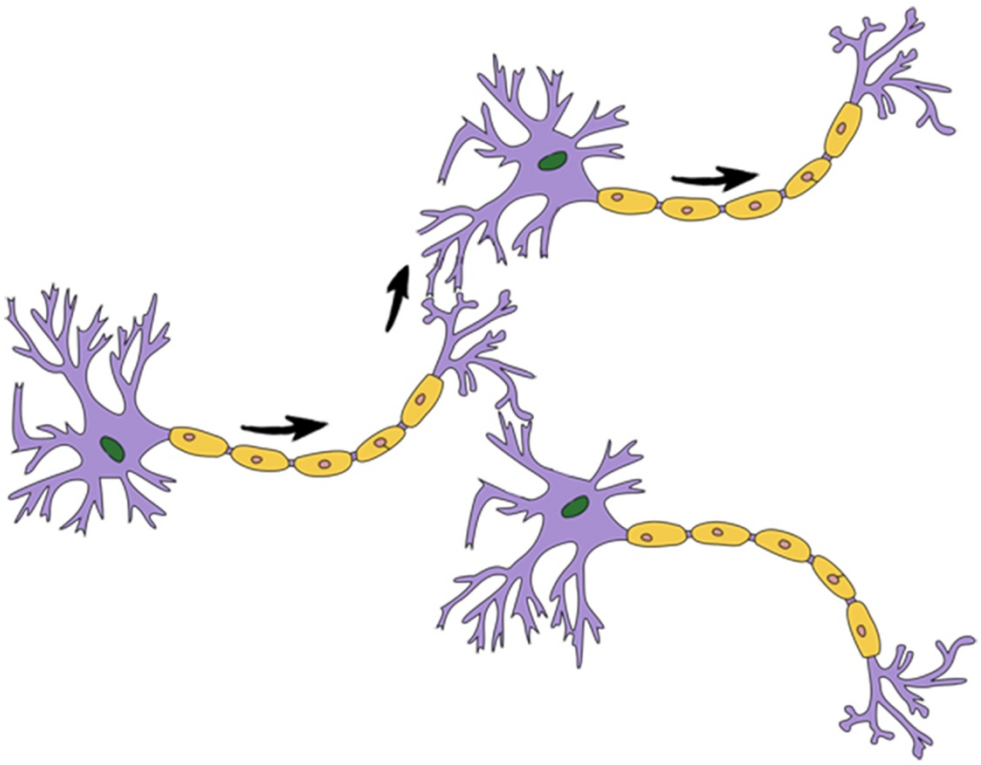
proportion to the amount of dopamine released when we chronically indulge in natural rewards[127] (sex,[128] sugar,[129] high fat,[130] aerobic exercise[131]) or virtually any drug of abuse.

DeltaFosB is what scientists call a 'transcription factor'. It flips on a very specific set of genes that physically and chemically alter the reward circuitry.[132] Think of dopamine as the foreman on a construction site barking the orders and DeltaFosB as workers pouring the cement. Dopamine is yelling, 'This activity is really important, and you should do it again and again.' DeltaFosB's job is to ensure you remember and repeat the activity.

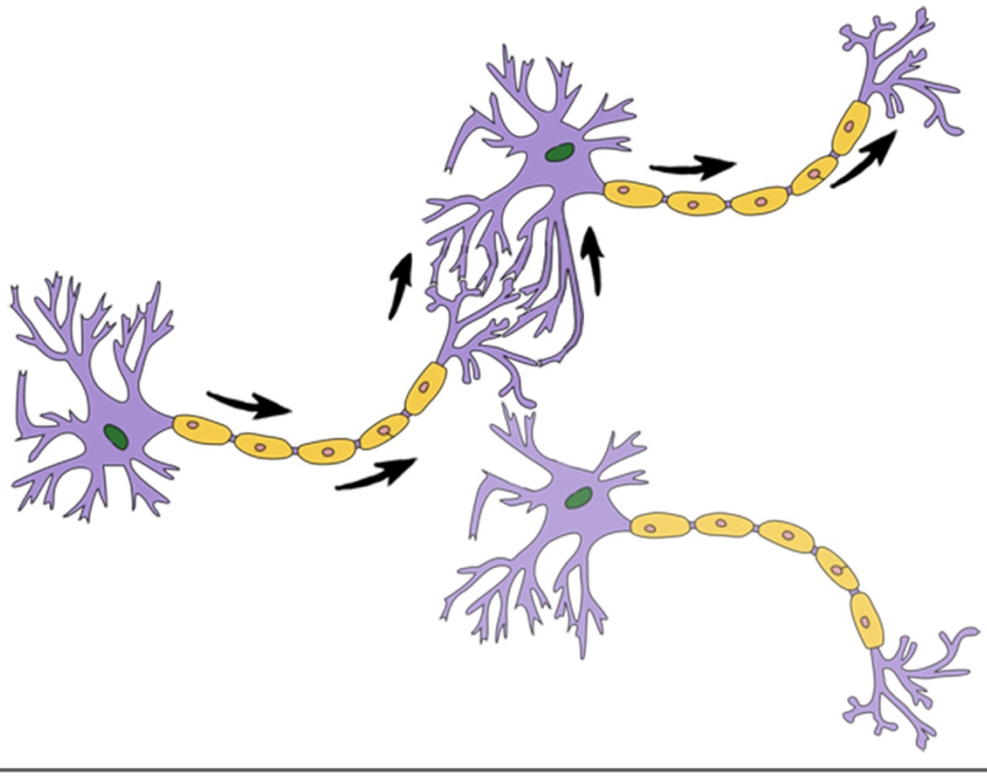
It does this by rewiring your brain to want whatever you have been bingeing on. A spiral can ensue in which wanting/craving leads to doing, doing triggers more surges of dopamine, dopamine causes DeltaFosB to accumulate – and the urge to repeat the behaviour gets stronger with each loop.

Sensitisation is based on the neurological principle, 'Nerve cells that fire together wire together'. Briefly, the brain links together the nerve cells for sexual excitement (in the reward circuit) with the nerve cells that store memories of the events associated with the excitement (the sights, sounds, sensations, smells, and emotions). Repeated activity strengthens the cell connections.

Nerve Cells that Fire Together ...



Wire Together



Stored in nerve connections, these associations are called cues, or triggers, by addiction experts. Anything that activates these pathways grabs our attention by increasing reward circuit dopamine. During evolution, the ability to react to cues worked in your ancestors' favour by helping them not to miss valuable opportunities.

For an alcoholic a cue to use might be walking by a pub or the smell of beer. For a heroin addict it might be a syringe. For a porn user it might be seeing his smartphone or the name of a porn site. When cues are activated sensitised neural pathways blast the reward circuit with a spike in electrical activity creating hard-to-ignore cravings to use.

This all happens unconsciously. All you know is that you instantly have an overwhelming 'need' to view porn. It can feel like a matter of life and death, such that all your resolutions take flight. In drug addicts the cue-induced dopamine spike can be as high as the spike from actually taking the drug,[133] and this is likely true for some porn users as well.

> *I caught a glimpse of a porn pic the other day and there was a distinct buzz in my brain, almost like a hot flash. Fortunately it freaked me out enough to get away fast.*

The brain changes initiated by DeltaFosB tend to keep us over consuming or, in the case of internet porn, riveted to what the brain perceives as a Fertilization Fest. But this set of neurochemical dominoes obviously did not evolve to create addicts. It evolved to urge animals to 'Get it while the getting is good.'

The point is that the mechanism of elevated dopamine leading to DeltaFosB accumulation initiates *both* sexual conditioning and addiction (more on addiction later). Each starts with a Pavlovian super-memory of pleasure (sensitisation), which then triggers powerful 'do it again!' urges.

When an addict stops using, DeltaFosB slowly degrades and is back to normal levels about two months after the last binge. However, the sensitised pathways remain, perhaps for a lifetime. Remember, the purpose of DeltaFosB is to promote the rewiring of the brain so that you will experience a bigger blast from whatever you have been over consuming. This memory, or deeply ingrained learning, lingers long after the initiating events.

Unlikely as it may seem, this single neurobiological discovery dismantles the claim that porn addiction does not exist. DeltaFosB accumulating in the reward centre of the brain is now considered to be a sustained molecular switch for both behavioural and chemical addictions.

The Brain Fights Back: A Double-Edged Sword

As increased cravings compel the user to binge on porn, overstimulation of the reward circuitry leads to a localized rebellion. If DeltaFosB is the gas pedal for bingeing, the molecule CREB functions as the brakes. CREB dampens our pleasure response.[134] It inhibits dopamine. CREB is trying to take the joy out of bingeing so that you give it a rest.

Oddly enough, high levels of dopamine stimulate the production of both CREB *and* DeltaFosB. Our bodies are equipped with countless feedback mechanisms to keep us alive and functioning well. It makes perfect sense for mammals *also* to have evolved a braking system for bingeing on food or sex. There comes a time to move on and take care of the kids or maybe hunt and gather. But the glitch in the CREB/DeltaFosB balancing act is that it evolved long before humans were exposed to powerful reinforcers such as whiskey, cocaine, ice cream, or porn tube sites. All have the potential to override evolved satiation mechanisms, including CREB's brakes.

Put simply, CREB doesn't stand much chance in the era of supernormal stimuli and widely available prescription and illicit drugs. What's CREB to do in face of a Big Mac, fries and milkshake dinner, followed by 3-hour Mountain Dew-fuelled *Call of Duty* session, and two hours of surfing PornHub while smoking a joint? What array of enticements did a 19-year old hunter-gatherer encounter to goose his dopamine? Perhaps a second helping of overcooked rabbit meat or watching the four girls he'd known since birth tan hides.

The numbed pleasure response induced by CREB is often called *desensitisation*. It leads to tolerance, which is 'the need for a higher dose to achieve the same effect.' Tolerance is a key feature of addiction, but can occur without developing all the brain changes seen in full-blown addiction. Substance addicts attempt to overcome CREB's effects by taking larger doses. Gambling addicts might place larger bets.

Today's internet porn users may find they need more videos, or VR porn, or cam-2-cam, or perhaps acting out a fetish to get the buzz their brain is desperately seeking. More often than not they try to overcome tolerance with new genres, usually more extreme, or even disturbing. As we saw, more intense stimulation can elevate dopamine (and arousal).

But CREB's effects don't limit themselves to a user's 'drug' of choice. Other things that used to make a porn viewer feel good, such as socializing, watching a movie or playing a favourite game, pale because of the dulling effects of CREB. Desensitisation leaves us bored, less satisfied, and often searching for anything to increase dopamine. It can lead a porn fan straight back to porn.

Nature plays a cruel joke. CREB's attempt to suppress dopamine and endogenous opioids to urge 'over indulgers' to take a break works against a chronic porn user. Numbing his pleasure response can drive him to seek out more extreme material, often swiping from clip to clip in search of the one that will restore his dopamine levels. Put simply, CREB can lead to tolerance, which may result in compulsive porn use and escalation.

You may be wondering how chronic overstimulation can induce two seemingly opposite effects. First, it can *increase* dopamine activity (sensitisation via DeltaFosB). Second, it can *decrease* dopamine activity (desensitisation via CREB124). The answer is that it's mostly about timing. But it's also about the neurological differences between *wanting* and *liking*.[135]

Sensitisation leads to high spikes of dopamine in response to cues and triggers associated with use. The dopamine spikes occur *before* ingesting the drug or masturbating to porn, and are experienced as cravings to use. However, on exposure to the same old stimuli less dopamine (and less opioids) are released (desensitisation). This dampening of pleasure occurs *during* drug use or while masturbating to porn. The activity is experienced as less pleasurable, increasing cravings for more.

Thus, two mechanisms once beneficial to our animal ancestors have unwanted consequences in the age of porn tube sites and omnipresent junk food. Sensitisation leads to greater *wanting* or more intense cravings, while desensitisation leads to less *liking* or a decline in overall

pleasure.[136] This disparity acts as a double-edged sword that drives compulsive use: overpowering cravings to use (sensitisation) combined with less fulfilment from both everyday activities and from the problematic behaviours (desensitisation). Brain scan studies confirm that porn addicts have greater reward system activation in the craving phase (wanting), but do not like porn any more than non-addicts.[137]

Sexual Conditioning and Adolescence

One outcome of chronic porn use is unanticipated sexual conditioning – which wasn't likely in baby boomers using *Playboy*. A millennial may easily wire his sexual excitement to a screen, constant novelty, voyeurism or bizarre acts. Worst case, he eventually needs both porn's content and delivery-at-a-click to achieve an erection or sustain arousal.

> *Before I quit I had the utmost trouble getting off. I actually had to close my eyes and imagine a CONSTANT stream of porn to climax. I was more or less using my girlfriends' bodies to help me jerk off. After a long streak without porn, I could climax easily, without thinking about it. It was a miracle. It was the best feeling ever.*

News stories about youthful porn use tend to focus on conscious learning. They assume that all we need to tell teens is that porn isn't like real sex and all will be well.[138] This remedy ignores the unconscious effects of porn viewing.

At the same time young Jamie is consciously learning that women 'love' ejaculate on their faces, he may be unconsciously learning that ejaculating on women's faces arouses him sexually. This kind of unconscious, conditioned learning takes place to some degree every time he finds porn exciting.[139]126 Of course, what turns Jamie on at age 14 may bear little relation to the femdom or incest porn he graduates to by age 16.

Superficial conditioning (or learning) can be summed up as, *'So this is how people have sex and this is how I should do it.'* Unconscious sexual conditioning can be summed up as, *'This is what turns me on'* or, at a brain level, *'This is what jacks up my dopamine and opioids*'. It could be as simple as preferring redheads. Or maybe dainty feet or pecs appeal more than breasts.

However our preferences arise, our brains evolved to record what turns us on and sensitise us to it. Yet once you wire up a new cue you have no way of knowing when it will trigger a future reaction. Much as Pavlov's dog learned to salivate to the bell, today's porn users can learn to wire unexpected stimuli to their erections. The brain's primitive reward circuitry isn't aware that the bell isn't food, or that the novel porn isn't 'my' porn. Its axiom is simply 'Arousal … I want it'.

As early as 2004 Swedish researchers reported that 99% of young men had consumed pornography, and more than half felt it had had an impact on their sexual behaviour.[140] As mentioned, a 2016 study found that 49% of the men reported viewing porn that was not previously interesting to them or that they once considered 'disgusting'. Interestingly, 20% of participants also said they used porn 'to maintain arousal with my partner.'

Even if you're watching tame porn and haven't developed any porn-induced fetishes, the issue of how you get your jollies can have repercussions. Are you training yourself for the role of voyeur, or to need something more arousing at the least drop in your dopamine, or to search and search for just the right scene for climax? Are you masturbating in a hunched-over position – or watching your smartphone in bed before sleep?

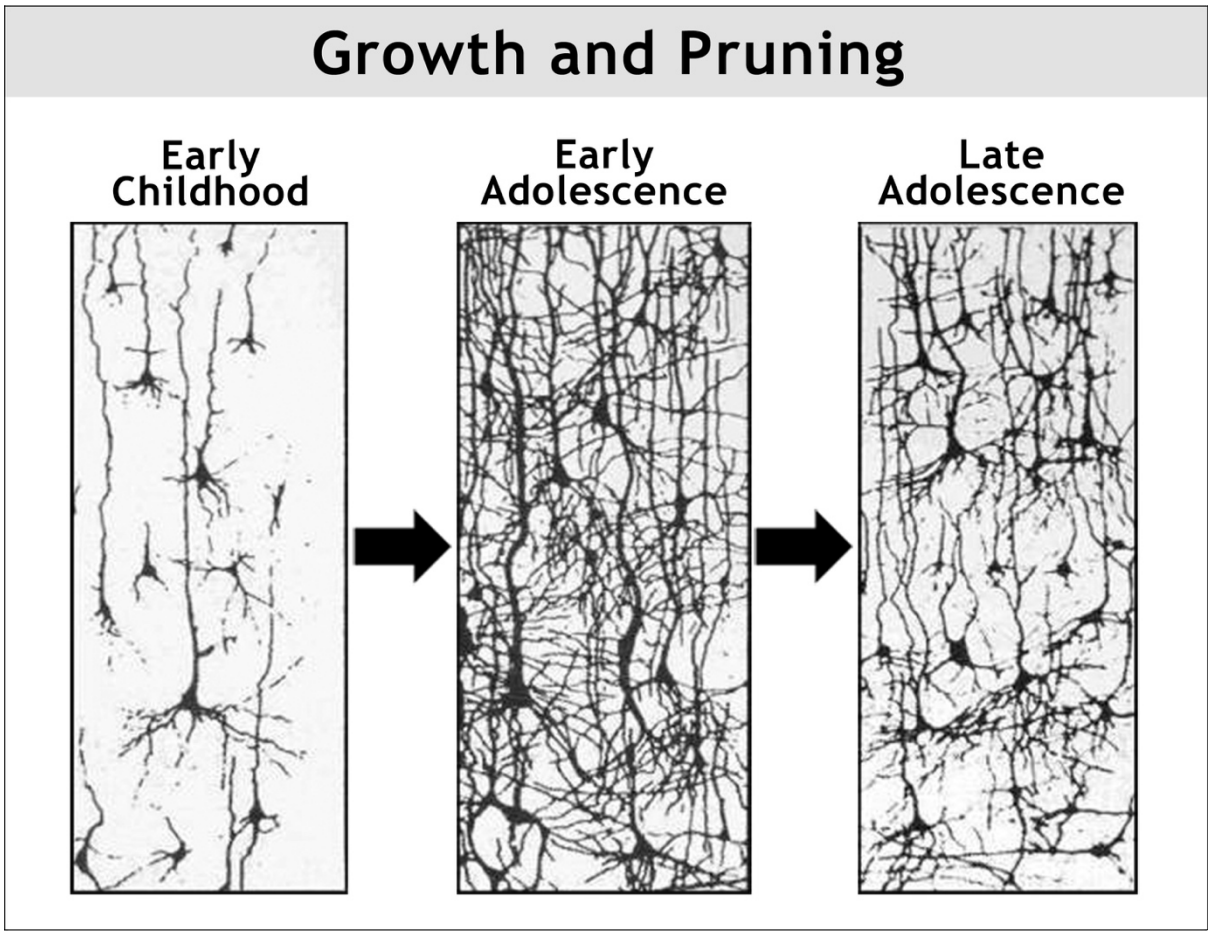
Each of these cues or triggers light up the reward circuit with the promise of sex ... that isn't sex. Nerve cells then solidify these associations with arousal by sprouting new branches to strengthen connections. Result? You may ultimately *need* to be a voyeur, click to new material, use porn to get to sleep, or seek out the perfect ending to get the job done.

A prime evolutionary task of adolescence (puberty until about age 24) is learning all about sex – both consciously and unconsciously. To accomplish this, the highly malleable adolescent brain wires to sexual cues in the environment.[141] Adolescents wire together experiences and arousal much faster and more easily than young adults will just a few years later.[142] Teens are especially vulnerable because their reward circuitry is in overdrive.[143] In response to internet novelty their brains produce higher spikes of dopamine, but become bored more easily. (This effect is exaggerated in problematic porn users.[144]) Their brains are also more sensitive to dopamine[145] and produce more DeltaFosB[146] (to 'remember and

repeat'). The adolescent brain's over-sensitivity to reward also means its owner is more vulnerable to addiction.[147]

Arousing stimuli can rock an adolescent's world in a way they won't an adult brain, and this showed up even in the brain scans of young porn users in a 2014 Cambridge study.[148] This neurochemical reality primes young brains, urging them to define sex according to what offers the biggest sexual buzz.

If that's not scary enough, remember that a natural sculpting process narrows a teen's choices by adulthood.[149] The brain actually shrinks after age 12 as billions of nerve connections are pruned and reorganized (as pictured).[150] The use-it-or-lose-it principle governs which nerve connections survive, leaving our hero with well-honed responses to life.[151] Thus a teen brain can deeply condition itself to internet porn with surprising ease, such that real sex eventually feels like an alien experience to some.



Once new connections form, teen brains hold tightly to these associations. In fact, our most powerful and lasting memories arise in adolescence – along with our worst habits.[152] By his twenties, our teen may not exactly be stuck with the sexual conditioning he falls into during adolescence, but it can be like a deep rut in his brain – difficult to ignore or reconfigure.

Getting Kinky

Research on conditioning sexual response in humans is limited, but shows that sexual arousal is conditionable,[153] and particularly prior to adulthood.[154] For example, when males view porn at the same time they view unsexy items such as a black boot[155] or a jar of pennies[156] they later became aroused (and got erections) to the boot or the penny jar alone. No porn necessary.

Sexual performance and attraction in animals can be conditioned to an array of stimuli that are not normally sexually arousing, including fruit/nut scents, the wearing of tiny rodent jackets, and even same-sex partners.[157] In a dramatic example of conditioning, researchers sprayed sexually receptive female rats with cadaverine (the odour of decaying flesh) and placed them in cages with eager young virgin males. Normally rats avoid decaying flesh. It's innate; it's not a learned behaviour. They will bury dead buddies and wooden dowels soaked in cadaverine. However, with their dopamine soaring in anticipation, these guys mated and ejaculated several times.

A few days afterward, the young males were placed in a large cage with normal-smelling females and females smelling like death. The cadaverine-conditioned rats got it on indiscriminately. Normal, experienced control males wouldn't go near the females that stank of death. How deep was the conditioning? A few days later, the conditioned ex-virgins received a wooden dowel saturated in cadaverine. They played with it, and many gnawed on it—just as they would have had the dowel been laced with something they normally love, such as chocolate or vaginal secretions.

In human females viewing porn has the ability to override feelings of disgust and increase desire to do something that a woman who is not viewing porn might find flat-out repulsive.[158] Such findings may parallel young men's escalation to porn that once repelled them or didn't

match their previous sexual tastes. Not surprisingly, studies link earlier onset of porn use to escalation to more extreme material.[159]

Sexual conditioning has shown up in three brain scan studies (fMRI), in which compulsive porn users viewed porn while researchers assessed brain activity. As expected, the compulsive porn users' brain response mirrored what occurs in substance addicts (greater cue-reactivity, or sensitisation). But these three studies added a twist. Instead of just flashing images of porn, the studies preceded each image with a *symbol* that predicted either a porn image or a non-porn image (i.e. tree, chair). For example, subjects might see a square seconds before the appearance of porn. After several rounds of this procedure subjects consciously and unconsciously connect a square with porn and sexual arousal.[160] All subjects quickly conditioned their arousal to symbols predicting porn. But compared to controls, the compulsive porn users' reward systems reacted more strongly to cues (symbols), and conditioning occurred more rapidly.

This is how scientists investigate sensitisation in the lab. They condition porn users' sexual arousal and dopamine activation to items that are not normally arousing. Such research helps explain why turning on your device or hearing your parents leave the house can give you ants in your pants.

One of these studies also found that porn addicts habituated faster to sexual images. Their reward systems lit up less for familiar porn. To prevent habituation, the porn addict needs to seek out a constant supply of novel porn, perhaps conditioning himself to new genres along the way.

Before 24/7 streaming porn, the usual sexual cues were other teens, or an occasional centrefold, or maybe an R-rated movie. The result was pretty predictable: Peers were a turn-on. Now, however:

> *I'm 25, but I've had high-speed internet access and started streaming porn videos since age 12. My sexual experience is very limited and the few times I've had sex have been total disappointments: no erection. Been trying to quit for 5 months now and finally have. I realize that I've been conditioned to the point where my sexual urges are deeply linked*

to a computer screen. Women don't turn me on unless they are made 2-D and behind my glass monitor.

Especially in an overactive adolescent brain, such unconscious wiring can lead to unexpected shifts in sexual tastes. If the majority of a teen's masturbation sessions are porn-fuelled, then brain maps related to Jessica in algebra may be crowded out. Spending years before your first kiss hunched over a screen with ten tabs open, mastering the dubious skills of learning to masturbate with your left hand and how to find sex acts your dad never heard of, does not prepare you for fumbling your way to first base, let alone satisfying lovemaking.

In a 2014 article, Norman Doidge wrote, 'We are in the midst of a revolution in sexual and romantic tastes unlike any in history, a social experiment being performed on children and teenagers … This level of porn exposure is quite new. Will these influences and tastes turn out to be superficial? Or will the new porn scenarios deeply embed themselves because the teen years are still in a formative period?'[161]

Fortunately, brain plasticity also works the other way. I see many guys quit porn and, months later, realise that the fetishes they thought were indelible had faded away. Eventually, they can't believe they once got off to X (and perhaps only to X).

Adolescent sexual conditioning likely also accounts for the fact that young men with porn-induced erectile dysfunction often need months longer to recover normal sexual function than older men do. The older men did not start out wiring their sexual response to screens, and may possess well developed 'real partner' brain pathways, or arousal maps. Typically they had reliable erections with partners for years before they met high-speed tube sites. Unlike younger men who grew up with the internet, the latter are simply re-learning.

More on Porn-Induced Sexual Dysfunctions

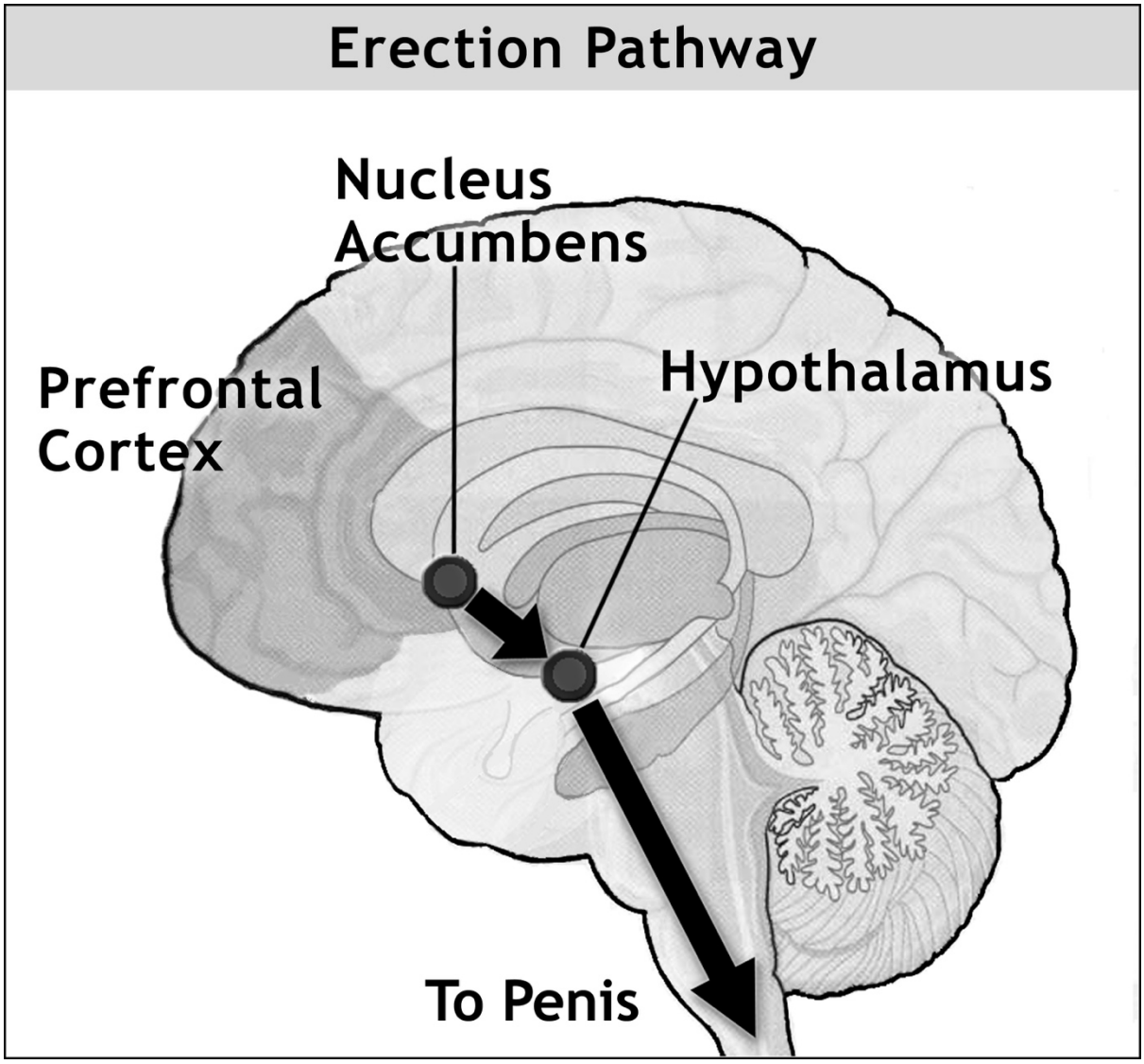
While only a few studies have documented men quitting porn to heal chronic sexual dysfunctions, 19 additional studies have linked sexual problems or lower arousal to porn use and porn addiction. In the paper I wrote with US Navy doctors, we hypothesized that porn-induced sexual dysfunctions arise from a combination of sexual conditioning (sensitisation)

and desensitisation of the reward system.[162] As described, a porn user can condition his arousal to everything associated with his porn use, such as a voyeur's perspective, constant searching, a parade of novel 'sexual partners', or fetish material.

However, none of this matches real sexual encounters. Real sex is touching, being touched, smells, connecting and interacting with a person, all without a voyeur's eye view.

Dopamine is odd. It shoots up when something is better than expected (violates expectations), but drops when expectations are not met.[163] With sex, it's nearly impossible to match internet porn's level of surprise, variety and novelty. Thus, once a young man thoroughly conditions himself to porn, sex may not meet his unconscious expectations. Unmet expectations produce a drop in dopamine – and erections. (A steady stream of dopamine surges is imperative for sustaining sexual arousal and erections.) Whether one is 25 or 55 the disparity between real sex and masturbating to internet porn is a key factor in porn-induced sexual dysfunctions. Masturbating to porn to prepare for sex is like playing golf for years to compete at Wimbledon. It's training for the wrong sport.

While sexual conditioning is the principal brain change responsible for porn-induced ED, it alone cannot account for all the symptoms men experience. Two of the most common, yet hard to explain, symptoms are the loss of morning wood (nocturnal erections) and the dreaded flatline. The absence of nocturnal erections generally occurs prior to quitting porn. It's important to note that urologists often use the absence of nocturnal erections to distinguish psychological ED from organic ED (i.e. blood vessel or nerve problems). It's possible that some men with porn-induced ED, accompanied by no morning wood, are incorrectly diagnosed as having organic ED. In contrast, the temporary flatline occurs *after* eliminating porn use. It typically manifests as lifeless genitals, no libido and the loss of attraction to real people.



Both symptoms point to changes in deeper brain structures directly involved in arousal and erections. Research reveals that erections require adequate dopamine in the reward circuit[164] *and* the male sexual centres of the brain.[165] Not long ago, Italians scanned the brains of guys with 'psychogenic ED' (as opposed to 'organic ED' arising from issues below the belt). Their scans revealed atrophy of the grey matter in the brain's reward centre (nucleus accumbens) and the sexual centres of the hypothalamus.[166] Lost grey matter equates with loss of nerve cell branches and connections with other nerve cells. Your eight-cylinder engine is sputtering along on only three cylinders. This translates into reduced dopamine signalling (reduced arousal).

The study is evidence that psychogenic ED is *not* always caused by an individual's state of mind (e.g., performance anxiety). It can be a consequence of changes to the reward circuitry

that result in persistently reduced dopamine signalling. This could help explain why the flatline and the absence of morning wood often accompany porn-induced sexual dysfunctions – and can take months to reverse.

This finding is consistent with results from a German brain scan study on porn users published in *JAMA Psychiatry*.[167] Both studies show less grey matter in the reward circuitry. In the German study, subjects who used the most porn had less grey matter and showed less arousal to sexy pictures. Both studies may be revealing the structural changes behind long-standing desensitisation. To answer the age-old question, size does matter, at least when it comes to grey matter.

Desensitisation and other brain changes arising from chronic overconsumption can often be picked up in brain scans, but sexual conditioning doesn't show up in pictures of the brain. Confirmation of this effect must come through self-reports of symptoms and recoveries. The fact that young guys often need longer to recover points to deep sexual conditioning during adolescence.

As we saw, adolescence is a key developmental window during which mammalian brains are primed to adapt their mating behaviour to arousing cues in the environment. Thereafter, brains begin to prune away unused circuitry – perhaps the very circuitry related to the pursuit of real partners that these guys' adolescent ancestors would have developed and strengthened as a matter of course.[168] Here's a typical account of a younger guy who had thoroughly wired his sexuality to internet porn:

> *What you're likely wondering is, 'For the love of god does the ED get better or am I torturing myself for no reason?!' I wondered that too. The answer is 'Kind of,' then 'Yes!' What you're likely going to experience once you do engage in sex is your brain saying, 'what the hell?' It is not used to actual sex as its primary way of being sexual. Real contact begins the 'rewiring' process. You will be re-sensitising yourself to actual sex. Sex after rebooting and rewiring feels WAY BETTER. Can't even describe it in words. So there will be a rewiring process where you may sputter and have a few backfires but eventually you fire on all cylinders. These days? Zero ED, I don't even have to think about it.*

What do guys who successfully recover from porn-induced ED suggest? Suggestion number one is to eliminate porn, porn substitutes, and recalling the porn you watched. Or to put it another way, eliminate all artificial sexual stimulation. By artificial I mean pixels, audio and literature. No porn substitutes, such as: surfing pictures on Facebook, Snapchat or dating apps, cruising Craigslist, underwear ads, YouTube videos, 'erotic literature', etc. If it's not real life, just say 'no'. Content isn't as much the issue as whether you are mimicking the behaviours that wired your brain to need novel, screen-based stimulation.

The second suggestion is to rewire your sexual arousal to real people. While this helps everyone recover, it may be a key component for young men with little or no sexual experience. This does not mean that you need to have sex to rewire. In fact, slowly getting to know someone is probably the best path. Hanging out, touching, and making out help connect sexual arousal and affection to a real person, and may be essential to recovery.

Pornography Addiction

A second adaptation that may arise from excessive porn consumption is *addiction*. As explained, addictive drugs only increase or decrease normal physiological mechanisms. All share one attribute: the ability to significantly elevate dopamine in our reward centre (nucleus accumbens). As explained, sexual arousal induces dopamine levels comparable to morphine, and lights up the same nerve cells hijacked by cocaine and meth (in contrast with other natural rewards). Internet porn addiction may turn out to be the 'purest' behavioural addiction in that the brain changes found in porn addicts could most closely resemble those seen in substance addicts.

Researchers know that all addictions, despite their differences, bring about an established set of core brain changes.[169] These, in turn, show up as recognized signs, symptoms and behaviours, such as those listed in this standard addiction assessment test, the 'Three Cs':

1. *craving* and preoccupation with obtaining, engaging in or recovering from the use of the substance or behaviour;

2. loss of *control* in using the substance or engaging in the behaviour with increasing frequency or duration, larger amounts or intensity, or in increasing the risk in use and behaviour to obtain the desired effect; and

3. negative *consequences* in physical, social, occupational, financial or psychological domains.

How great is the risk of porn addiction? Well, it's common knowledge that dopamine-raising substances, such as alcohol or cocaine, can create addictions. Yet only about 10-15% of humans or rats that use addictive drugs (except nicotine) ever become addicts. Does this mean the rest of us are safe from addiction? When it comes to substance abuse, perhaps yes.

However, when it comes to unrestricted access to super-stimulating versions of natural rewards, such as junk food,[170] the answer is no,[171] although certainly not every consumer gets hooked. The reason that highly stimulating versions of food and sexual arousal can hook us – even if we're not otherwise susceptible to addiction – is that our reward circuitry evolved to drive us toward food and sex, not drugs or alcohol. Today's high fat[172]/sugar foods[173] have hooked far more people into destructive patterns of behaviour than have illegal drugs. 70% of American adults are overweight, 37.7% obese.[174]

We don't know how many people are negatively affected by internet porn use, given the privacy that surrounds its use, and the fact that users don't necessarily connect porn use with their symptoms. However, in a 2014 poll of 1,000 US adults, 33% of men 18-30 either thought they were addicted to porn or were unsure. In sharp contrast, only 5% of men 50-68 thought they were, or might be, addicted.[175] What about studies? Two 2016 studies asked male porn users about problematic porn use. One group were assessed for addiction and the other self-reported. In both, rates were 28%.[176]

Supernormal versions of natural rewards have the ability to override our brain's satiation mechanisms – the 'I'm done' feeling.152 So, it's hardly surprising that unlimited erotic novelty is compelling for large swathes of the population, including many who would not be susceptible to substance addiction.

I do occasionally drink but not too much. I have no addictions except porn. I grew up thinking it was a normal thing and that everyone does it. I thought that it might even be good for me.

*

I battled with porn addiction for years, whereas quitting smoking was a single decision and I never looked back. Unlike smoking, porn addiction is tied to an underlying biological need, which merges with the addiction and makes everything more difficult.

Some psychologists and clinicians outside the addiction-neuroscience field claim it is a mistake to employ addiction science to understand behaviours like compulsive gambling and out of control internet porn use. They argue that addiction only makes sense when talking about substances like heroin, alcohol or nicotine. This view often finds its way into the media. But the latest research into the nature of addiction contradicts this.

You may not be aware of it but addiction is perhaps the most extensively studied mental disorder. Unlike most mental disorders listed in psychiatry's *Diagnostic and Statistical Manual* (*DSM-5*), addiction can be reproduced at will in laboratory animals. Researchers then study the causal mechanisms and resulting brain changes down to the molecular level.

Whether investigating sexual behaviour, gambling, alcohol, nicotine, heroin or crystal meth, thousands of brain studies confirm that all addictions modify the same fundamental brain mechanisms[177] and produce a recognized set of anatomical and chemical alterations.[178] Addiction experts no longer doubt that behavioural and substance addictions are fundamentally one disorder.

Already, some 230 brain studies on internet addicts reveal the presence of the same core brain changes seen in substance addicts.[179] If internet use itself is potentially addictive, then it's evident that internet porn use is too. Sure enough, brain studies on internet porn users themselves now affirm this.

The four primary brain changes involved in addiction were recently outlined in a landmark review by Director of the National Institute on Alcohol Abuse and Alcoholism (NIAAA) George F. Koob and his co-author, Director of the National Institute on Drug Abuse (NIDA) Nora D. Volkow.[180] By the way, the review also mentioned 'sex' as a behavioural addiction:

> *We conclude that neuroscience continues to support the brain disease model of addiction. Neuroscience research in this area not only offers new opportunities for the prevention and treatment of substance addictions and related behavioral addictions (e.g., to food, sex, and gambling)....*

So, what are the four fundamental brain changes addiction appears to cause? In simple, very broad, terms they are 1) Sensitisation, 2) Desensitisation, 3) Dysfunctional prefrontal circuitry (hypofrontality), and 4) Malfunctioning stress system. Studies on porn users/sex addicts now find evidence of each of these changes. (Citations are listed below after each.)

The first two we have already discussed in depth, as they are equally relevant to symptoms related to unwanted sexual conditioning.

1. Sensitisation *or an unconscious super-memory of pleasure which, when activated, triggers powerful cravings.* Are you suddenly much hornier when your wife goes shopping? Unlikely. But perhaps you feel as if you are on autopilot, or someone else is controlling your brain. Maybe you feel a rush, rapid heartbeat, even trembling, and all you can think about is logging onto your favourite tube site. Sensitised addiction pathways are screaming, 'Do it now!' As of August, 2017 there are 19 studies reporting sensitisation or cue-reactivity in porn users/sex addicts.[181]

It's important to know that during abstinence sensitised porn pathways grow even stronger for a while. It's as if your reward system is screaming for stimulation but only the addiction will do. The branches (dendrites) on nerve cells processing addiction-related reward signals become 'super spiny'.[182] This overgrowth of little nubs allows for more nerve connections and greater excitation. It's like growing four extra pairs of ears at a *Spinal Tap* concert. Now, when cues hammer your reward circuit, your craving scale hits eleven.

With sensitisation amplified, signals activate the reward centre employing the same mechanisms involved in normal learning and memory.[183] They may weaken but stubbornly remain. Long after conscious cravings fade away, sensitised porn pathways may be activated by anything associated with prior use (cues, stress, etc.). Concern about reactivation of dormant addiction pathways is why 12-step organization Alcoholics Anonymous advises complete abstinence. In the case of non-substance addictions, such as internet, food and erotic imagery, however, sobriety is more challenging to define.

2. Desensitisation *or a numbed response to pleasure*. Reduced dopamine and opioid signalling and other changes leave the addict less sensitive to everyday pleasures and 'hungry' for dopamine-raising activities and substances. Desensitisation is probably the first addiction-related brain change porn users notice. They need greater and greater stimulation to achieve the same buzz ('tolerance').

Earlier I said that chronic overconsumption induces CREB, which inhibits reward circuit dopamine. But if the addict abstains, CREB levels rapidly decline. For this reason CREB cannot account for the addict's loss of pleasure or depression that can often linger for several months. Human and animal studies identify a decline in dopamine or opioid receptors, and the loss of grey matter as more lasting causes of desensitisation. Instead of protecting itself against excessive stimulation by reducing neurochemical levels, the brain removes some of the receptors, thus making you less sensitive to the opioids and dopamine you do produce.

Think of it this way: if someone continues to scream, you cover your ears. When dopamine-sending nerve cells keep pumping out dopamine, the receiving nerve cells cover their 'ears' by reducing dopamine (D2) receptors. (There are five types of dopamine receptors.) To make matters worse, D2 receptors help put the brakes on over-consumption, so their loss means cravings are harder to resist. Desensitisation is not 'damage.' Nerve cells could rebuild lost dopamine or opioid receptors in a flash. Rather, desensitisation represents a negative feedback system in overdrive (probably maintained by epigenetic changes).

German researcher Simone Kuhn explained, 'We assume that subjects with a high porn consumption need increasing stimulation to receive the same amount of reward. That would fit perfectly the hypothesis that their reward systems need growing stimulation.'[184]

A principal driver of addiction is this imbalance between the overpowering cravings to use caused by sensitisation while simultaneously experiencing less pleasure from everyday activities caused by desensitisation.[185]170 Six neurological studies have so far reported desensitisation or habituation in porn users/sex addicts.[186] Now let's turn to the two remaining aspects of addiction that we haven't discussed.

3. Dysfunctional prefrontal circuitry *manifests as weakened willpower combined with hyper-reactivity to addiction cues.* The prefrontal cortex (resting behind the forehead) is the seat of what scientists call 'executive control'. It supplies problem-solving, attention, planning, foreseeing consequences, and the regulation of goal-directed behaviour. Important in addiction, the prefrontal cortex governs willpower and inhibits behaviours we might later regret.

To help us control impulses the prefrontal cortex extends two types of nerve pathways into our reward system: 'go for it' pathways and 'let's stop and think about it' pathways. These pathways function as a gas pedal and brakes for the less reflective reward system. For example, if the emotional centres in your reward system (amygdala) urge you to punch your boss, your prefrontal cortex rapidly computes the consequences and fires messages down the 'think about it' pathways to inhibit you.

With addiction the increasingly powerful 'go get it' pathways amplify cravings to use porn, while the physiologically weakened 'think about it' pathways have a harder time inhibiting your drives. It's the neurological equivalent of a devil on one shoulder and an angel on the other – with the devil resembling King Kong.

Physical evidence of dysfunctional prefrontal circuits can be observed in fMRI studies, and specialized psychology tests can identify poorer executive-control. There are now 13 studies reporting altered prefrontal circuitry or poorer executive functioning (hypofrontality) in porn users/sex addicts.[187]

4. Malfunctioning stress system *manifests as amplified cravings, inhibited willpower, and myriad withdrawal symptoms.* Our stress system not only prepares us to fight

for our lives, or to flee from danger, it also modifies the brain and body to endure longer-term stressors. Some experts view addiction as a stress disorder because it not only affects circulating stress hormones (cortisol and adrenaline), but also induces multiple alterations in the brain's stress system.

Three of these alterations make it very challenging to quit.[188] First, stress increases dopamine and cortisol, turning even minor stressors into severe cravings. Even in the absence of cues, stress activates sensitised addiction pathways. Second, stress inhibits the prefrontal cortex and executive function, including impulse control and the ability to fully comprehend the consequences of our actions.

Last but not least, when an addict deprives his brain of its fix, his stress system goes into overdrive. It induces many of the common withdrawal symptoms reported by addicts, such as anxiety, depression, tiredness, insomnia, irritability, aches and mood swings. He feels like crap, which often sends him back to the addiction. To date, three studies have demonstrated dysfunctional stress systems in porn users/sex addicts.[189] Interestingly, one of the studies actually uncovered epigenetic changes in the stress genes of sex addicts.

To sum up, if these four neuroplastic changes could speak, *desensitisation* would be moaning, 'I can't get no satisfaction'. At the same time, *sensitisation* would be poking you in the ribs saying, 'hey, I've got just what you need', which happens to be the very thing that caused the desensitisation. *Hypofrontality* (dysfunctional prefrontal circuitry) would be shrugging and sighing, 'bad idea, but I can't stop you'. Your *malfunctioning stress system* would be screaming, 'I NEED something NOW to take the edge off!'

These phenomena are at the core of all addictions. One recovering porn addict summed them up: 'I will never get enough of what doesn't satisfy me and it never, ever satisfies me'. Recovery reverses these changes. Slowly, the addict relearns how to 'want' normally.

Once upon a time, naysayers proclaimed that the absence of porn studies on withdrawal symptoms and tolerance (the need for more stimulation to get the same effect) meant that 'porn addiction doesn't exist'. In fact, neither tolerance nor brutal withdrawal symptoms are a prerequisite for addiction. For example, cigarette and cocaine addicts can be thoroughly

hooked, but their withdrawal experience is typically mild compared with alcoholics or heroin addicts.[190] (What all addiction assessment tests share is, 'continued use despite negative consequences'. It's reliable evidence of addiction.)

However, in the forums I monitor ex-porn users regularly report surprisingly severe withdrawal symptoms that are reminiscent of drug withdrawals: insomnia, anxiety, irritability, mood swings, headaches, restlessness, poor concentration, fatigue, depression, social paralysis and the sudden loss of libido that guys call the 'flatline' (apparently unique to porn withdrawal).

It wasn't until 2017 that two research teams asked internet-porn users directly about withdrawal symptoms. Both reported withdrawal symptoms in 'problematic porn users'.[191] Also, Swansea and Milan universities reported that internet addicts, most of whom had been accessing porn or gambling,[192] suffered a form of cold turkey when they stopped using the web, just like people coming off drugs.[193]

As for tolerance, three studies have now asked porn users specifically about escalation into new genres or tolerance, confirming both.[194] Employing various indirect methods, an additional 14 studies have reported findings consistent with habituation to 'regular porn' or escalation into more extreme and unusual genres.[195]

But 'Porn Addiction' Isn't *Recognized,* Right?

The American Psychiatric Association (APA) has so far dragged its feet on including addictive/compulsive porn use in its diagnostic manual. When it last updated the manual in 2013 (*DSM-5*), it didn't formally consider 'internet porn addiction', opting instead to debate 'hypersexual disorder'. The latter umbrella term for problematic sexual behaviour was recommended for inclusion by the chairs of all of the *DSM-5's* Work Groups, following years of review. However, in an eleventh-hour 'star chamber' session (according to a Work Group chair), *DSM-5* Summit officials unilaterally rejected hypersexuality, citing reasons that have been described as illogical.[196]

In reaching this position, the *DSM-5* disregarded formal evidence, widespread reports of the signs, symptoms and behaviours consistent with compulsion and addiction from sufferers and their clinicians, and the formal recommendation of thousands of medical and research experts at the American Society of Addiction Medicine.

In 2011 ASAM had generated an extensive Public Policy Statement with FAQs,[197] stating unequivocally that sexual behaviour addictions are real and that addiction is a primary disorder indicating underlying brain changes. From the ASAM FAQs:

> *QUESTION: This new definition of addiction refers to addiction involving gambling, food, and sexual behaviours. Does ASAM really believe that food and sex are addicting?*
>
> *ANSWER: The new ASAM definition makes a departure from equating addiction with just substance dependence, by describing how addiction is also related to behaviours that are rewarding. ... This definition says that addiction is about functioning and brain circuitry and how the structure and function of the brains of persons with addiction differ from the structure and function of the brains of persons who do not have addiction. ... Food and sexual behaviours and gambling behaviours can be associated with the 'pathological pursuit of rewards' described in this new definition of addiction.*

The *DSM* was criticised by Thomas Insel, then Director of the National Institute of Mental Health, who objected to its approach of ignoring underlying physiology and medical theory to ground its diagnoses solely in symptoms. The latter permits erratic, political decisions that defy reality. For example, the *DSM* once incorrectly classified homosexuality as a mental disorder.

Just prior to the *DSM-5's* publication in 2013, Insel warned that it was time for the mental health field to stop relying on the *DSM*. Its 'weakness is its lack of validity,' he explained, and 'we cannot succeed if we use *DSM* categories as the "gold standard."' He added, 'That is why NIMH will be re-orienting its research away from *DSM* categories.'[198] In other words, the NIMH would stop funding research solely based on *DSM* labels (and their absence).

Since the *DSM-5's* publication, hundreds more internet addiction and internet gaming addiction studies, and dozens of internet porn addiction studies have come out. They continue to undercut the *DSM-5's* position. Incidentally, despite media attention to the *DSM-5's* stance, practitioners who work with those with problematic sexual behaviours have continued to diagnose such problems. They employ another diagnosis in the *DSM-5* ('other specified sexual dysfunction') as well as one from the World Health Organization's current diagnostic manual, the *ICD-10* ('other sexual dysfunction not due to substance or known physiological condition').[199]

After I finalised the 2017 version of this text, the World Health Organization set right the APA's excessive caution. The ICD-11 incorporates a diagnosis for 'Compulsive sexual behaviour disorder', suitable for those who struggle with pornography.[200] However, top neuroscientists who have investigated internet porn's effects believe that compulsive sexual behaviour would best be *recategorised* as an addictive disorder based upon its neurobiological similarity to other behavioural disorders such as gambling.[201]

This brings us to the 'compulsion' versus 'addiction' discussion. Outside the addiction field, you can find vocal addiction naysayers who insist that gambling addiction, video-game addiction and porn addiction are not addictions but rather *compulsions*. This is a red herring. I have asked these naysayers, 'how do the neural correlates for a compulsion to use something differ from the neural correlates for an addiction to something?' (*Neural correlates* refer to the brain circuits, neurochemicals, receptors and genes underlying a disorder.)

The 'compulsion' advocates never answer because, in fact, there is no physical difference at the brain level between a gambling addiction and a compulsion to gamble – both involve sensitisation. There is only one reward centre and one reward circuit. Core brain changes seen in behavioural addictions occur equally with drug addictions *and* compulsions to use. These are the brain changes associated with addictive behaviour by whatever label. If it walks, talks and quacks like a duck, it's a duck. (Of course, specific addictions each have unique characteristics as well. For example, heroin addiction drastically reduces opioid receptors throughout the body, which may produce particularly severe withdrawal symptoms.) As ASAM explained in its definition of addiction:

This new definition makes clear that addiction is not about drugs; it's about brains. It is not the substances a person uses that make them an addict; it is not even the quantity or frequency of use. Addiction is about what happens in a person's brain when they are exposed to rewarding substances or rewarding behaviours…

When Does One Cross the Line?

Many ask the obvious question: *'How much is too much?'* This question presumes that porn's effects are binary.[202] That is, you either have no problem, or you are a porn addict (or have other porn-induced problems). However, asking where one crosses the line ignores the principle of neuroplasticity: the brain is always learning, changing and adapting in response to the environment.

Studies reveal that even a small amount of supernormal stimulation can rapidly alter the brain and change behaviour. For example, it took only five days to induce marked sensitisation to video games in healthy young adults.[203] The gamers weren't (yet) addicted, but elevated brain activity mirrored subjective cravings to play. In another experiment, nearly all the rats given unrestricted access to high-fat, high-sugar food binged to obesity.[204] It took only few days gorging on junk food for the rats' dopamine receptors to decline (reducing their satisfaction). Less satisfaction drove the rats to binge.

What about porn users? Again, a German brain scan study (not on addicts) correlated porn consumption with addiction-related brain changes and less brain activation to porn.[205] An Italian study reported that 16% of high school seniors who consumed porn more than once a week experienced low sexual desire. (Zero percent of the non-porn users reported low sexual desire.)[206] The takeaway is that addiction is not required for measurable brain changes or negative effects.

As we learn and adapt to our sexual environment, sexual conditioning, sensitisation, and other addiction-related brain changes, occur on a spectrum. They can alter our brain, perceptions, priorities, and even our sexual function.

This is why questions such as *'Does this visual count as porn?'* or *'How much porn use causes an addiction?'* are misguided. The former is like asking whether it's slot machines or blackjack that leads to a gambling addiction. The latter is like asking a food addict how many minutes she spends eating. The fact is, the brain's reward centre doesn't know what porn is. It only registers levels of stimulation through dopamine and opioid spikes. The mysterious interaction between the individual viewer's brain and the chosen stimuli determines whether or not a viewer slips into addiction.

Isolating Cause and Effect

Addiction naysayers frequently insist that porn users who develop problems all had pre-existing conditions, such as depression, childhood trauma or OCD. They maintain that excessive porn use is the result, not the cause, of those problems. Of course, some porn users do have pre-existing issues and will need additional support.

However, no one falls into addiction without engaging in chronic overstimulation. Moreover, research does not support the assumption that young people without pre-existing conditions can engage in excess without risk of developing symptoms.[207] For example, a rare longitudinal study tracked young internet users over time. Controlling for potential confounding factors, it found that 'young people who are initially free of mental health problems but use the internet pathologically' develop depression 2.5 times more often.[208]

A fascinating experiment, which would be impossible to duplicate in the West, began when Chinese researchers measured the mental health of incoming students.[209] A subset of these students had never spent time on the internet before arriving at university. Twelve months later, scientists evaluated the internet newbies' mental health again. Fifty-nine of some 2,000 freshmen had already developed internet addiction. Said the researchers:

> *After their addiction, significantly higher scores were observed for dimensions on depression, anxiety, hostility, interpersonal sensitivity, and psychoticism, suggesting that these were outcomes of Internet addiction disorder.*

Comparing the newbie addicts' scores on mental health before and after, the scientists found that:

- *Before they were addicted to the Internet, the scores of depression, anxiety, and hostility for students with Internet addiction were lower than the norm.*
- *After their addiction (one year later), the dimensions... increased significantly, suggesting that depression, anxiety, and hostility were outcomes of Internet addiction, and not precursors for Internet addiction.*

Said the researchers:

We cannot find a solid pathological predictor for Internet addiction disorder. Internet addiction disorder may bring some pathological problems to the addicts.

In short, the students' internet habits apparently caused their psychological symptoms. More recently, Taiwanese researchers showed that there is a correlation between teen suicide ideation/attempt and internet addiction, even after controlling for depression, self-esteem, family support, and demographics.[210]

Chinese researchers have also confirmed that while high-risk internet abusers exhibit definite signs of depression (such as loss of interest, aggressive behaviour, depressive mood, and guilt feelings), they show little evidence of a permanent depressive trait.[211] In other words, their symptoms may stem from their internet abuse rather than underlying, pre-existing characteristics.

Another Chinese study measured depression, hostility, social anxiety and internet addiction in 2,293 twelve and thirteen year-olds twice, a year apart. Those who had become addicts exhibited increased depression and hostility compared with the non-addicted group. Further, those who began as addicts but were no longer addicted at the end of the year showed decreased depression, hostility, and social anxiety compared with those who remained addicted.[212]

Two 2017 studies had internet users abstain from specific internet applications. Danish Facebook users saw significant improvements in life satisfaction and mood with a one-week abstinence,[213] while Chinese gamers experienced less cravings and depression after a 3-6 month break.[214] Psychiatrist Victoria Dunckley has reported similar dramatic improvements in her young patients who take a hiatus from interactive devices.[215] Conversely, when Belgian researchers assessed 14-year old boys' academic performance at two points in time, they found that 'an increased use of internet pornography decreased boys' academic performance six months later.'[216]

These findings are consistent with the results informally reported by thousands of recovery forum members who quit porn and experience benefits in mood, motivation, academic performance, social anxiety, etc. Severe symptoms, followed by noticeable improvements, undermine the claim that internet problems arise only in people with pre-existing disorders or characteristics.

Are Some Porn Users Misdiagnosed?

Although symptoms such as erectile dysfunction, social anxiety, concentration problems and depression are quite different, they share a common finding in the scientific literature. As explained, one brain change that occurs is desensitisation. Again, this term refers to a general dialling down of a person's responsiveness to all pleasure – a baseline drop in dopamine and reduced dopamine sensitivity. Evidence of desensitisation has been found even in moderate porn users.[217]

A decline in dopamine signalling is associated with:

- Diminished sexual behaviour,[218] a possible cause of sluggish erections/climaxes,
- Decreased risk-taking[219] and increased anxiety, combined with a tendency toward angry overreaction,[220] any of which can decrease willingness to socialize,
- Inability to focus,[221] which can account for concentration and memory problems, and
- Lack of motivation[222] and healthy anticipation, which can lead to apathy,[223] and procrastination, and contribute to depression.[224]

In fact, when a medical student courageously allowed doctors to deplete his dopamine briefly using a pharmaceutical, look what happened:

> *During increasing dopamine depletion in this case, a range of subjective experiences appeared and disappeared consecutively. These experiences resembled negative symptoms [loss of motivation, dulled senses, decreased fluency, lower mood, fatigue, poor concentration, anxiety, restlessness, feelings of shame, fear], obsessive-compulsive symptoms, thought disorders, and anxiety and depressive symptoms. [Bracketed items are enumerated elsewhere in the article cited.]* [225]

Addiction researchers have measured a decline in dopamine and dopamine sensitivity in the brains of many addicts, including internet addicts.[226]

The flipside is that when dopamine and related neurochemicals are properly regulated, sexual attraction, socializing, concentration, sexual responsiveness, and feelings of wellbeing are more effortless. I suspect that a return to normal dopamine signalling helps explain why many guys report similar sets of diverse improvements after they unhook. Again, preliminary results show that a four-week period of abstinence from porn left people more willing to take risks, more extroverted, more conscientious, more altruistic, more able to delay gratification and less neurotic.[227]

Unfortunately, many healthcare providers still assume that porn use cannot cause symptoms like depression, brain fog, low motivation or anxiety. They inadvertently misdiagnose internet porn users as having primary disorders without inquiring about their internet habits. Porn users are then surprised when quitting porn resolves their symptoms:

> *I don't think society knows what internet porn really does to a man. All they really associate porn with is ED. Porn turns a man into a scared boy. I was socially awkward, depressed, had no motivation, couldn't focus, very insecure, weak muscle tone, my voice was weaker, and I had absolutely no control over my life. Men are going to doctors getting prescribed all kind of meds, when really it often comes down to porn and what it does to your brain and body. I'm off porn now and feel better than I felt in years.*

*

Quitting is the anti-depressant I needed. 9 months ago I was a 25-year old university dropout, working a job I hated and depressed. A few months after I quit porn, I got my superpowers. I did a lot of things for the first time, including kissing a girl within two minutes of meeting her and being invited to another girl's apartment. I think that I don't have depression anymore. There still are downhills, but nothing like before with no energy for anything and suicidal thoughts. My secret? In the last month I've used internet for maybe an hour. I have decided to start university once more in September even though I have to pay for everything myself.

With regard to porn-induced sexual problems, professionals educated prior to high-speed porn were often trained that sexual tastes are as innate as sexual orientation. Instead of encouraging patients to experiment with quitting to reverse porn-induced tastes, they may propose more drastic treatment:

In 2012, I tried to get help from a professional psychotherapist/ sexologist. I plucked up the courage to tell the therapist that I also had a 20-year problem with compulsive porn use. I hit a wall of incomprehension. This psychotherapist tried to convince me that it was a high sexual desire (hypersexual disorder) and irreversible paraphilias (anal sex and rough porn scenes). The therapist said porn addiction doesn't exist and wanted to prescribe me a potent anti-androgen drug to reduce sex drive. I didn't agree, being aware of its side effects, like gynecomastia [breast growth].

Evidently, healthcare providers are also treating some young men for erectile dysfunction and delayed ejaculation who simply need to quit porn. In a single day, I read two posts to this effect. The first young man's uncle was a psychiatrist, who had told him porn-induced erectile dysfunction was impossible. The young man had experimented anyway and recovered. The other guy was a 32-year old man whose doctor finally recommended a penile implant when injections didn't work (let alone Viagra). He resisted, discovered the information on how porn can cause ED, experimented and recovered. Another man faced a similar situation:

The medical profession is far behind the times. I spent thousands of dollars on doctors, including a well known urologist specializing in ED (had to travel hours for that one); thousands on tests; thousands on pills. 'Erection to porn means it's in your head ... take some Viagra.' Not once did any health care professional say to me, 'Hey, watching porn too much can cause sexual dysfunction.' Instead, they offered other explanations, which are not proven to be linked to ED and typically did not apply to me anyway (e.g. anxiety, stress...even though you don't show any indication of either; diet...even though your weight is normal and you eat a balanced diet; low testosterone...even though low T hasn't been linked to ED except in extreme cases, and your T is not really low).

Then there's absolutely horrible advice from 'sexologists' who are so bent on being 'sex positive', they not only deny the potential negative consequences of porn use, they actively ridicule the notion of porn-induced ED.[228] *So, though I feel stupid for not making the link between porn and ED myself, the fact is I sought professional advice and porn was never brought up except in a positive light: 'Everyone does it, it's normal...in fact, it's healthy.' I evaluated the possibility of surgical intervention. It would be between $25k and $30k out of pocket and the results are not encouraging (penile revascularization). The day after that appointment I stumbled on this information. Oh my god...what a revelation and relief. And it works. I'm not 100%, but I've improved dramatically and things keep getting better. All I had to do was quit fapping to porn. Unreal. Honestly, I'm a bit angry given that I sought solutions from professionals, including specialists, who graciously accepted my hard earned cash yet gave me bad advice.*

How many men receive outdated information and treatments they don't require? Do their brains primarily need a rest to return to normal sexual responsiveness? Recovery from porn-induced problems may be a natural outcome of giving up chronic overstimulation.

Bottom line, given what we know about the links between behaviour and brain function, it seems reckless to prescribe psychotropic drugs to young people without first addressing potential overuse of the internet. And also reckless to prescribe them sexual enhancement drugs without addressing internet porn use.

3

REGAINING CONTROL

The road of excess leads to the palace of wisdom. William Blake

Although people report many benefits from recovery, the biggest gift is regaining control of your life. A recovered porn user explains:

> *Despite what some people say, quitting will not make you into a god of confidence and ability, although for the first few months it'll really feel like that. Quitting will give you more control of your own life. It's a little bit like the transition from adolescence to adulthood. Instead of acting on impulse, you'll be learning self-restraint and mindfulness with one of your most primal instincts, which will flow over into every part of your life and make your life's decisions be entirely up to you.*
>
> *When I started this 500 days ago, I had trouble concentrating; I couldn't commit to a goal for more than a week at a time. Whenever I had a day off I wasted it in lazy indulgence, knowing that I could be doing more with my time. Now, I can handle 50, 60 hour work weeks regularly without even noticing it. Now, I can exercise regularly and stick to it. Now, I'm in a relationship unlike any I've ever been in because I can finally treat my partner as another human being rather than sometimes as an object of desire (I now know firsthand that my own desires aren't as important as they make themselves out to be). Now, I'm constantly improving myself instead of just wishing I could.*

The first step toward regaining control is to give your brain a rest from all *artificial sexual stimulation* for several months. Shift your attention to real life. Among other things, this will help you establish whether chronic overconsumption of pornography, or some other issue, is underlying your symptoms.

Ideally, an extended time-out also allows you to:

– restore the sensitivity of your brain's reward circuitry so you can again enjoy everyday pleasures,
– reduce the intensity of the 'gotta have it!' brain pathways that drive you to use,
– re-establish your willpower (strengthen the brain's prefrontal cortex), and
– reduce the impact of stress such that it doesn't set off severe cravings.

Next, you stay consistent because it can take many months, or even a couple of years, for the 'I want to watch porn right now!' pathways to fire less frequently – and then die down.

Some people call this process 'rebooting'. It's a way of rediscovering what you are like without porn in your life. The idea is that by avoiding artificial sexual stimulation you are shutting down and restarting the brain, restoring it to its original factory settings, even.

The metaphor isn't perfect. You cannot go back in time to a 'restore point', or erase all the data, as you would when you wipe clean a computer's hard drive. However, many people do reverse their porn-related problems by giving the brain a well deserved rest from porn, porn fantasy and porn substitutes. And often the metaphor is a useful part of the process. After all, the problematic behaviours and symptoms of porn addiction are material in nature. They are inscribed in the structures of the brain. By changing behaviour we change those structures. Over time new ways of life are reflected in changes in brain function.

Through trial and error, rebooters have discovered that surfing Facebook, dating apps or erotic services sites for images is like an alcoholic switching to lite beer: counterproductive. In short, artificial sexual stimulation includes anything your brain might use in the way it has been using porn: cam2cam erotic encounters, sexting, reading erotica, friendfinder apps, fantasizing about porn scenarios ... you get the idea.

The goal now is to seek your pleasure from interacting with real people without a screen between you, and awaken your appetite for life and love. At first, your brain may not perceive real people as particularly stimulating. However, as you consistently refuse to activate the porn pathways in your brain, its priorities gradually shift.

I actually went a full 6 months without even visiting a porn site. When I next saw one I was surprised by how cheesy and corny porn looked. Since then I really haven't had much

interest in watching it. Porn is to sex what looking at a photograph of a Ferrari is to driving one.

*

When I got back from a conference yesterday I was exhausted physically and mentally. But this time I discovered an inner reservoir of energy I never expected to find. The sex was incredible, passionate, and unbelievable. I felt like I was 20 years old all over again. After 5 years of being 'too tired' to have sex in times like these I now know the problem isn't about fading chemistry with my wife but about wasting my sexual energy fapping to porn all the time.

Initially the rebooting process is challenging. Your brain can get very testy when its fix is not forthcoming when it summons you with a craving. However, freedom lies in allowing it to return to normal sensitivity and weaken any addiction pathways. Only then will you be truly free to set your own priorities.

One guy described the process this way:

When you remove a source of pleasure from the brain, it is like taking away the leg of a table. The whole thing becomes rocky and unstable. The brain has two options: one, to make you hurt like hell in every way it can think of to 'encourage' you to put the table leg back again, or two, to accept that the table leg is really gone, and figure out how to re-balance without it. Of course, it tries Option One first. Then, after a while, it gets to work on Option Two, all while still pushing Option One. Eventually, it seems like the brain re-balances, giving up on Option One, and fully succeeding at Option Two.

In this chapter we'll start with standard tips that rebooters frequently share with each other. Then we'll look at the most common rebooting challenges and pitfalls. Finally, we'll address a few questions that often come up.

Keep in mind that brains, histories and circumstances vary. There is no magic bullet that works well for everyone. Pick and choose the tips that might serve you in retraining your brain. Do not get caught up in, 'am I doing this right?' It is you who decides the length and

parameters of your reboot, depending on your goals and current situation. Many rebooters (without porn-induced ED) aim for 100 days or three months, broken up into shorter interim goals. Those with ED sometimes need far longer.

A reboot is your laboratory. If your plan isn't producing the results you want, adjust. Recognize that it often takes a couple of months to know if any particular approach is working, so unless you have fallen back into bingeing on porn, stay your chosen course for a couple of months at least.

> *It's amazing what you learn doing this. I think I now fully understand the saying that 'knowledge is power.' Once you know how something works and how it affects you, it's much easier to muster the willpower to make a change if you wish.*

Word to the wise: Rebooting doesn't guarantee that a person who has had porn problems can safely return to internet porn in the future. Many guys learn this the hard way. They assume their recovered erections mean they can use porn or porn substitutes, only to end up with severe symptoms again.

Recommended Suggestions

Here are some of the most familiar tips I see on the recovery forums:

Managing access

Remove all porn

Delete all porn from your devices. It can be a wrench, but this action sends your brain the signal that your intention to change is ironclad. Remember to delete back-ups and the trash. Also get rid of porn site bookmarks and your browser history. One guy claimed to have 'heirloom porn' that he absolutely could not part with. He burned it to a disk, wrapped it, duct-taped the packet like it contained the proprietary formula for Coca-Cola, and stored it in an inconvenient location. Once he recovered he chucked it away.

Move your furniture around

Environmental cues associated with use can be powerful triggers because they fire up sensitised pathways. Drug addicts are told to avoid friends, neighbourhoods and activities associated with previous use.

You can't avoid yourself or move, but you can make some changes, and then take care not to use porn in the new configuration. For example, consider using your online devices only in less private locations, which you don't associate with porn use. Get rid of your 'masturbation chair' or simply move your furniture around:

> *The reorientation of my apartment has been wonderful as I don't feel any of the same associations that I did in the past set-up. It's weird how moving everything a few feet and turning items a few degrees can change the energy surrounding your attachment.*

More ideas:

> *I put my desktop computer away. It's the one I've masturbated on for years, and it's the one that's least reliable with the filtering. I don't use it for anything but porn and wasting time. I can finish all I need to get done on my laptop.*

*

> *I converted my desk into a standing desk, which has worked miracles on my poor internet browsing habits. Since I'm not comfortably sitting in a chair my computer usage has been reduced to things I need to do instead of whatever I want.*

Consider a porn blocker and an ad blocker

Porn blockers are not fail-proof. They are like speed-bumps. They give you time to realize that you're about to do what you really don't want to do. Early in recovery, before your self-control is restored, blockers can be quite helpful. Eventually, you won't need them. Free porn blockers are available at these sites:

– Qustodio – http://www.qustodio.com

– K-9 – http://www1.k9webprotection.com

– Esafely.com – http://www.esafely.com/home.php

– OpenDNS – https://www.dnsfilter.com/ /

I highly recommend OpenDNS or some other kind of web filtering service, especially if it comes with a 3-minute delay before new settings take effect. That way, even if you falter, the 3 minutes give you enough time to realize you really don't want to do this, and unset those settings. Block all sexual, dating and blog categories. Tumblr is a sneaky one you can't afford to let loose.

Note: If you are a videogamer, using a porn-blocker can be risky. Your brain is accustomed to getting some of its dopamine hits from finding ways around obstacles. You may unthinkingly treat the porn blocker like just another quest. If this happens, delete your porn blocker and try extinction training (below) or some other approach.

In any case, consider using an ad blocker. That way you won't have to see wiggling images in your sidebar when making holiday plans or ordering vitamins. Many guys find ad blockers extremely helpful in warding off temptation. 'AdblockPlus' is free.

Consider a day-counter

Various forums offer free day-counters. Beneath your posts a bar graph shows your progress to your goal, and it updates automatically. Some people find it very satisfying to track their progress visually.

Counters get mixed reviews. The risk is that if someone slips back into porn use, he may think of his days as game points, and use his newly reduced day count to rationalise continuing to use porn for a while 'because I won't lose many accumulated days.' Such binges erode progress more than isolated incidents do, so if you get a day-counter, take a long-term view. Be pleased with your overall count of porn-free days.

Ultimately, what matters is not days but brain balance. Brains do not all return to balance on a set schedule, and while brains definitely need time to reboot, accumulated days aren't the whole story. Brain balance also benefits from exercise, socializing, time in nature, increased self-control, better self-care, meditation, and so forth.

An alternative to setting a long day-count goal is to set mini-goals for yourself. That way you repeatedly get a rewarding sense of achievement even as you crawl toward a more distant goal.

Extinction training (not for everyone)

Remember Pavlov's dog? You may not realize it, but Pavlov didn't just teach his dog to salivate at the sound of a bell. He later taught it to *stop* salivating to the bell by ringing the bell and then withholding meat (repeatedly).

This process is known as 'cue extinction'. You weaken the link or pathway between a stimulus and a habitual response. Some porn users are able to use this same principle to strengthen their self-control:

> *(Age 16) Every time I was on my PC I would open a porn website. Once the site opened I would turn it off so I could test my willpower. Those first 2 weeks were the hardest by far and I still don't know how I was able to do it. After 30 days I could tell I was forgetting about porn. Today I'm clean for 90 days and I barely think about it. I feel like a new person. During this 3 months I masturbated a few times (like 5), but I never watched porn. Getting off is just something that every teenager needs to do now and then.*

If extinction training (sometimes known as Exposure Response Prevention Therapy) is too risky for you because glimpses of porn sites throw you into a binge, try an indirect approach to strengthening your willpower first. Exercise (or any beneficial stressor) and meditation are good choices. Both are discussed below.

Support

Join a forum, get an accountability partner

Involvement in an online community where others are experimenting with giving up porn can inspire you, give you a place to rant, supply the good feelings that come from supporting others, and generate new tips for speeding progress:

> *Don't fight this fight alone. In the end, you'll be the one pushing yourself to success, but an online community can give you that little bit of extra motivation when you're at your absolute lowest.*

Sites such as NoFap.com and Reboot Nation facilitate finding accountability partners. This is a way for you and one of your peers to support each other in more depth while preserving anonymity. One-on-one support definitely benefits some people.

The downside of both accountability partners and forum participation is that they are online activities. As problematic internet porn use is internet-based, you need to spend less time online, not more. While most people agree that a forum helped during the first phase of recovery, eventually it can become a way to avoid real life. At that point, some check a forum only when they need encouragement.

Addiction has a social context, as does recovery. Whether you find support and recognition online or off is less important than that you find it.

Therapy, support groups, healthcare

A good therapist who understands how today's potent online sexual novelty can alter sexual responsiveness with partners, and that behavioural addictions are as real as any others, can be very helpful. Some facilitate support groups for people struggling to quit porn. There are also self-run 12-Step groups, both online and off.

If you are struggling with additional issues, such as childhood trauma, sexual abuse or family problems, all of which naturally make emotional attachment challenging, a good counsellor can be a sound investment.

Again, if you think you may have obsessive-compulsive disorder (OCD), you may need medication for a bit when you attempt to quit pornography to ease the anxiety of withdrawal. See a doctor. An OCD sufferer said:

> *The antidepressants have really helped. They kick me in the rear and force me to look at my situation positively and not get so wound up in it all.*

Keep a journal

Keep a record of your progress. Rebooting is not a linear process. There are good days and bad days, and on the bad days your brain will try to persuade you that you have made no progress and never will. Reading earlier entries from your journal can swiftly put things back in perspective:

> *When the cravings were bad, I would look at my journal and see how I'd come too far to quit. Put a password on it if you don't want someone else to find it.*

Journals get things off your chest that you would not feel comfortable sharing. Alternatively, you can share those things in an anonymous, but public online journal. Various forums allow you to journal for free (NoFap.com, RebootNation.org, YourBrainRebalanced.com). You and your peers offer each other support and advice based on journal entries.

Managing Stress, Improving Self-control and Self-care

Exercise, beneficial stressors

Of all the techniques rebooters experiment with, exercise seems to be the most universally beneficial. It's an excellent distraction from urges, improves self-confidence and fitness, and is even associated with better erectile function in men under 40.[229]

Exercise is a solid mood regulator. Scientists surmise that it can help ease addiction because acute bouts of exercise increase dopamine concentrations, and regular exercise leads to sustained increases in dopamine and related adjustments.[230] This helps counteract the

chronically low dopamine signalling that haunts recovering addicts before their brains reboot.[231] Here are comments from two people:

> *I cannot overemphasize the importance of push-ups. They are always accessible, and take only thirty seconds or so to do a good 20. They will get your heart pumping, and will divert your body's attention away from those urges almost instantly. If urges still linger, do sets with a few seconds break, until your arms feel like they'll fall off.*

*

> *Lift weights. It helps. If you're feeling self-conscious use the machines instead of free weights. The staff at the gym will help you if you have no idea how to use the machines.*

Exercise is known as a 'beneficial stressor'. That is, stressing your system slightly causes it to respond with enhanced feelings of wellbeing. Some rebooters report that beneficial-stressors reset the brain's sensitivity to pleasure. Visit www.gettingstronger.org for the physiology behind exercise, intermittent fasting, daily cold showers, and so forth.

The latter were once laughed off as a mainstay of Victorian theorists of manliness, but daily cold showers get rave reviews from many who seek a quick route to restoring lost willpower and emotional equilibrium. Cold showers have even been proposed as a medical treatment for depression.[232]

> *I'm on an 81-day streak right now, taking the coldest showers I can. My desire to escape is strong, but I resist, and walk out of the shower like I'm the king of the world.*

Remember, it's about finding what works for you. If a cold shower improves your mood, and makes you less tempted to waste time slumped in front of a computer, then it is useful, especially when you're struggling with withdrawal. It's not a good idea to overdo anything, but you knew that already.

Get outside

Researchers have found that time in nature is good for the brain. It boosts creativity, insight and problem solving.[233] Rebooters have noticed this too:

> *There's something very, very powerful about being away from technology and in a natural environment that accelerates rewiring in my experience.*

If you live in a city, walk to parks. According to researchers at the University of Sheffield, tranquil, living environments can positively affect human brain function.[234]

> *Get outside into the natural light and breathe fresh air. We weren't meant to look at glowing rectangles and breathe recycled air 24/7.*

Socializing

Humans evolved as tribal, pair-bonding primates. Our brains cannot easily regulate mood on their own, at least not for long. It's not unusual to feel anxious or depressed (or self-medicate with an addiction) when isolated.

By the same token, connection is some of the best health insurance the planet offers. It helps reduce the hormone cortisol, which can otherwise weaken the immune system under stress. 'It's much less wear and tear on us if we have someone there to help regulate us,' explained psychologist/ neuroscientist James A. Coan in the *New York Times*.[235]

When recovering users force their attention away from their habitual 'relief ', their reward circuitry looks around for other sources of pleasure. Eventually it finds the natural rewards it evolved to find: friendly interaction, real mates, time in nature, exercise, accomplishment, creativity, and so forth. All ease cravings.

If you've been feeling anti-social, start simply:

> *There are a lot of places where you can get used to being out and around people that are pretty nonthreatening. Hang out and read in a library or bookstore, or take a magazine to*

a coffee shop or park bench. Or take long walks outside. These get me out of my head and make me feel like a member of society.

*

I just smile every time I feel awkward, haha. And it works.

*

I am building relationships with people I have met at networking events, clubs, and so forth. I have been doing some volunteer counselling work once a week, and try to do at least one 'random act of kindness' each day for a complete stranger. This definitely helps bring a bit of balance.

Another easy option is to attend meetings that have a set structure, such as Toastmasters or a dance class.

Whatever you choose, practice eye-contact with those you pass. Start with older people. Make a game of it. See if you can improve your score each time. Add a smile, nod or verbal greeting, until your natural charisma kicks in automatically.

Meditation, relaxation techniques

Daily meditation can be very soothing for anyone struggling with the stress of withdrawal. Research also shows that it helps the rational part, the prefrontal cortex, to stay in command.[236]

Forum members' thoughts on meditation:

I heard that you should not think about quitting your addiction. Instead you should learn how to meditate. The more you meditate the stronger your mind becomes and the weaker your addiction gets. My thoughts about porn have reduced drastically.

*

When I meditate consistently, the part of my brain that knows that I have to leave porn behind (the pre-frontal cortex) has much more influence. And when I don't meditate regularly, the part of my mind that comes up with rationalizations to use porn as way to deal with boredom and stress has more sway. It seems that the battle to overcome porn is literally a battle between the rational, planning functions and the more emotional, reactive parts of the brain.

Creative pursuits, hobbies, life purpose

The first few weeks are primarily a battle of distraction. A rebooter explained the importance of filling your time differently by exploring and learning new things:

You can't expect to live the exact same lifestyle you've been living, (i.e., get up, do a little work, surf web, do a little more work, surf web, surf NSFW, do a little work, surf web, etc.) and expect anything to change. That pattern won't magically disappear without conscious effort.

Your brain will thank you. And, just like learning new things, creativity is both a great distraction and inherently rewarding because of the anticipation of achieving something important:

I enjoy music, and quitting has helped both my creative ability for music, as well as my listening enjoyment. I've probably 'composed' 20 songs in my head in the last few months since quitting. Also, I'm much more creative with my jokes and conversational threads. All of a sudden conversations feel like playing music. I am planning to join the Improv Club at university, and see where I can take this. Stage-performance doesn't seem daunting at all anymore. Exciting, if anything.

*

I'm a writer and musician, though I have let my art fall by the wayside over the past few years as I retreated into porn. I thought that I was dealing with writer's block because I

could not allow myself to put words on paper or notes on strings. Since I started this journey, however, I am working on three songs with a fourth starting to work its way out of me.

Many people report taking up hobbies, new and old, as they reboot.

Here are comments of two guys:

I've taken up cooking and baking. It's a great distraction, it's fun, and I get a reward when I'm finished.

*

Yoga gets me out of the house and helps me burn off some steam. Lots of beautiful women there too. Very beautiful women. Mmm ... women.

Tip: Limit activities that cause 'empty' dopamine highs, such as frequent, intense videogaming, junk food, gambling, trolling Facebook, Instagram, Tumblr, Twitter and Tinder, meaningless TV, and so forth. Steer for activities that produce lasting, sustainable satisfaction even if they aren't as rewarding in the short-run: having a good conversation, organizing your work space, receiving/giving a cuddle, goal-setting, visiting someone, building something or gardening. In short, anything that gives you a sense of connection or moves you toward longer-term objectives.

A powerful distraction like internet porn can be a form of self-medication for boredom, frustration, stress or loneliness. But if you're reading this book you probably realize that chronic use of a supernormally stimulating distraction is a Faustian bargain that can take a toll on goals and wellbeing.

The better you feel, the less you need to self-medicate. Getting fit and learning to eat healthily are a start. For thousands of years humans had to wrestle with the challenge of maintaining brain balance without today's drugs. Many left insightful, inspiring solutions that are now available to all via the internet. There's no need to reinvent the wheel. Dig around. Think big. Take the time to develop a philosophy of life. Act on it.

Attitude, Education and Inspiration

Be gentle with yourself

Those who reboot with relative ease keep a sense of humour, accept their humanness, love sex but respect their sexuality, and gradually steer themselves into a new groove. They don't bludgeon themselves, or threaten themselves with doom.

Sex is a fundamental drive, and giving up the intense stimulation of regular porn use is a big shift for your brain. Ease your way through the transition, forgive yourself if you slip (but try to avoid bingeing), and keep going. Think of snowboarding or surfboarding. Stay flexible. In this regard, acceptance and mindfulness therapy shows promise for treating problematic porn use.[237]

Learn more about what's going on in your brain

Whether rebooters know a lot or a little about science, they generally value learning how they got where they are and how to change course:

> *Just knowing what is going on in the brain and what is causing it gives me a feeling of relief. It's crazy how slyly the mind can trick you. With this new knowledge I feel that I can recognize what is happening and act on it before it's too late.*

The site I created, www.yourbrainonporn is a clearing house for relevant science. Resources range from easy-to-understand articles and videos by lay people to vast collections of medical abstracts and studies about behavioural addiction and how porn alters sexual responsiveness.

Keep yourself inspired

Rebooting can be a mighty challenge, and it helps to find a well of inspiration to draw from on a regular, even daily, basis. Maybe you frequent an online forum where there is lots of

encouragement. Maybe you have a favourite philosopher or spiritual book you find soothing and uplifting:

> *My favourite was a book that said to take a goal you want to accomplish; decide what steps you have to take in order to accomplish that goal; and do it no matter how you feel. I decided to have a better social life, so I joined university clubs when I didn't feel like it. I joined some academic clubs for my major when I didn't feel like it. I started conversations with people in my classes when I didn't feel like it. I went to parties that I knew about when I didn't feel like it. I went to bars and clubs with people when they invited me when I didn't feel like it. I asked girls on dates when I was really nervous about it. It was really hard, but eventually I got a really great group of friends.*

There are also thousands of inspiring recovery self-reports, culled from various forums, on www.yourbrainonporn.com. Click on 'Rebooting Accounts' under 'Rebooting'.

Rebooting Challenges

Withdrawal

Perhaps because our culture has been slow to acknowledge the honest-to-goodness physical addictiveness of today's pornography, the severity of withdrawal symptoms can catch those who quit by surprise.

> *Withdrawals suck. We don't talk enough about them. They are why we fail. They are our brain's reward centre begging us, threatening us, punishing us, pleading with us, rationalizing with us why we need to use porn. Withdrawals are painful, they are physical, mental, and emotional pain. They are the jitters, the shakes, the sweats, odd pains in odd places, the brain fog we feel when quitting, and our brain's way of telling us all that unpleasantness can go away with just a little harmless fix. When going through withdrawal I felt I had a sinus infection and my teeth actually hurt. I did not have a sinus infection and my teeth were fine, but my brain, at some level, had to make me feel bad to try and make me feel good through a porn release.*

In all addictions terminating use can prompt very real neurochemical events. Typically, these include an exaggerated stress response and a powerful sense that the world is hopelessly grey and meaningless in the absence of the missing stimulus. The first two weeks are often the toughest:

> *Let me tell you the truth right when you decide to take the challenge: You won't be able to do it. Or, at least, that's what you're going to think every single day, and it'll feel so true that you just can't take it anymore. You will be going through the emotional ups and downs of withdrawal. You are like a man setting out to climb a tall mountain who has never walked before. At first it will seem impossible, but as you walk a little bit more each day, your muscles, i.e., your willpower, will grow and it will become possible. So take it one day at a time, always. Don't look at what you're doing as fighting a war to quit for X days, or it seems too big to take on. Realize that what you're doing is just saying 'no' once. When that urge comes up, you say 'no', you scream into a pillow, you scream internally, you throw those thoughts away, you distract yourself, you realise how much better you've done without porn, and how much you have to lose going back and starting over and maybe not even getting this far. You don't let that urge go anywhere. That's it. Not X days of constant willpower, just a subtle lifestyle change, a quiet 'no' whenever the random desire flickers up and tries to take hold.*

Mood swings are often the first sign that something is shifting:

> *My brain is like a see-saw right now. My day can turn from a great one to a near suicidal one in the space of a few hours. It's difficult to endure but it reassures me that something is trying to correct itself.*

Gradually, colours return, enthusiasm increases and stability reigns. In his TEDx talk "The Pleasure Trap", psychologist Doug Lisle gives examples of how overeaters reverse food cravings with periods of fasting or juice-only. The same principle of increasing sensitivity by removing overstimulation applies to all natural rewards, including masturbation to internet porn.

Some porn users report little withdrawal distress. Others report severe withdrawal symptoms. Here's a 26-year old, long-time porn user's report:

The first week I had the worst type of insomnia imaginable. I don't remember falling asleep at all the first 6 days. In my mind, it made Hell Week of Navy SEAL training look easy. During the weeks that followed, things started turning around a bit but really became noticeable after about 3 months. I actually started getting energy to do things.

Some people had no reason to suspect withdrawal would be so agonizing:

Not having had a major porn problem, I assumed the benefits would be marginal. But if you think you don't have an addiction, try stopping and see what happens. In my case, a period of quite punishing withdrawal symptoms. They lasted for at least a month. Something was clearly profoundly affecting me neurochemically, as within a 24hr period I might experience the extremes of a kind of shimmering, exultant euphoria followed by a moribund depressive blackness. Around the month mark I started feeling significantly better about myself and things began falling into place; people seemed better disposed towards me, my body language improved, I started joking around at work and generally seeing the lighter side of life.

Common withdrawal symptoms include: irritability, anxiety or even panic, unaccustomed tears, restlessness, lethargy, headaches, brain fog, depression, mood swings, desire to isolate, muscle tightness, insomnia, and severe cravings to use porn.

Emotional things come up heavily: depression, strange anxieties, worthlessness. It was everything that I had been struggling with – all at once. It was like having a really bad day x 10! And, of course, the horniness. You really start to learn to control your fantasies because if you don't, you'll feel the discomfort.

Less common, but not unusual, symptoms include: frequent urination, shakes, nausea, tension in the chest creating difficulty breathing, despair, hot flashes or feeling cold even in front of a fire, overeating or loss of appetite, unaccustomed wet dreams, semen leakage when using the toilet, and fullness, pressure or aching in the testicles (cold water helps).

Mood swings like a pregnant 13-year old girl. I'll see a neat-looking tree and then cry about it. Intense, insatiable desire for human contact...yet a terrible fear of actually

getting it. Insatiable food cravings...Almost ate an entire cake in 24 hours. I have a VERY SHORT FUSE, you idiot! LOL I treat people like crap when I feel like this. This is the worst symptom.

Another frustrating thing about withdrawal symptoms is that recovery isn't linear; it's up and down. Some people only experience acute withdrawal symptoms during the first two or three weeks. Others still have sporadic withdrawal symptoms for months, informally dubbed 'Post-Acute Withdrawal Syndrome', or PAWS.

Just wanted to give some hope to those of you struggling with the mental ailments associated with this shit. For well over a year and a half, I haven't been able to find joy in much of anything. Now, I'm beginning to feel music the way I used to. I can enjoy a conversation with a stranger instead of struggling through the social anxiety associated with it.

Simply put, as much hell as these past couple years have put me through, I am truly improving. This is SO clearly PAWS, or post-acute withdrawal syndrome. Absolutely no doubt. The 'up and down' nature of the symptoms, the slowwwwww nature of the recovery, and the symptoms themselves.

Good days gradually become more frequent, but bad days continue for a long while before the brain is really back to normal. It's unwise to measure your progress against anyone else's recovery time. Some people need longer than others to restore brain balance.

Flatline

One young man described the flatline as 'the gruelling, mysterious initiation one endures but never speaks of.' It's a standard withdrawal symptom in guys with porn-induced erectile dysfunction, but it also happens to some who don't have ED at the time they quit. I touched on this temporary effect earlier, but there's more to say. Here's a typical description of the flatline:

After a few days of brain tantrums (cravings), I went into a flatline for weeks. Basically I felt totally indifferent about girls, sex, everything. A little voice from the porn beast

nagged at me in the back of my mind, but mostly, I just didn't care. And my penis was very lifeless and small. It was like somebody just pulled the plug on whatever machine provides my sex drive. No libido at all.

Needless to say, guys want to bail out of recovery at this point and rush back to porn, afraid that they will permanently lose it if they don't use it. A decade ago, however, a courageous 26-year old Australian kept going – and discovered that somewhere around week seven, his flatline ended and his libido (and erections) came roaring back.[238] Since then, many guys have braved the flatline and documented their recoveries.

No one yet knows what causes the flatline, but here's one guy's theory:

We started masturbating to internet porn very young, kept doing it like crazy until we exhausted our minds and bodies. When you become exhausted, your brain and body enters sleep mode (that we call flatline) in order to recover so it can react to stimulation again. If we had let it rest back then it would probably been a flatline of only a few days before things returned to normal. But we didn't let it rest. Despite being in a flatline, we used porn to continue until we reached rock bottom. So now it doesn't take a few days for things to recover. It takes a few months or even longer in some cases. But it passes.

Everyone's flatline is somewhat unique in terms of severity and duration. Some guys' libido and erections come back simultaneously, either gradually or all at once. For other guys, libido returns before erections, or vice versa. Whatever its origins, the flatline is definitely weird. Prior to high-speed porn, cutting out porn use was *not* associated with a severe, temporary drop in libido. As I said in chapter two, I suspect the brain's sexual centres are implicated because other kinds of addicts don't temporarily lose sexual function when they stop using.

If you're having porn-related sexual performance problems, should you tell your partner? Many guys report that it really helps to educate a partner about the flatline and its causes. Here's a 23-year old woman whose boyfriend of the same age needed 130 days to return to normal:

Tell your girlfriend. It takes the pressure off you and helps you to avoid hurting her. PIED [porn-induced ED] is nothing to feel bad about. Nowadays porn is really common and nearly every guy is using porn or has used porn sometime (and every girl knows that). It could happen to anyone, as you don't have to be an excessive porn user to get your brain messed up. My boyfriend really tried to explain everything and I'm so thankful for that! It feels so much better to know what's going on. It also brings you closer together when your partner includes you in something like that because then it becomes a thing you get through together.

Not every guy who quits porn experiences a temporary loss of libido (flatline) during recovery. However, the percentage of those who report flatlines appears to be rising as the guys who started on high-speed comprise a growing portion of ED sufferers. As one guy said:

Some guys flatline a long time, some don't, some never get one. It's difficult to gauge anything because this problem is so new. Hopefully in a couple years we'll start to see some trends and be able to give better advice to those who have just quit. Unfortunately we're the pioneers in this.

Insomnia

It's important to stay well rested as fatigue can trigger porn use. However, many rebooters have relied on their porn ritual as a sleep-aid for years. Without it, sleep is elusive at first. (Insomnia is a standard addiction withdrawal symptom.) Find what works for you.

I thought fapping was the only way I could sleep, but only 10 days in I'm already sleeping great. Falling asleep when my head hits the pillow is truly awesome.

Avoid replacing porn use with alcohol. Yes, it will help you fall asleep, but alcohol can wake you up too early, not fully rested. It's also not a good idea to replace an addiction with something else that is potentially addictive. Here are some suggestions that worked for others:

The first week was pretty rough for me in terms of sleep quality. One thing I did to break out of it was not to use my laptop/read in bed. I set it up on the kitchen table and would only lie down in bed when I got tired.

*

Definitely get a reading lamp. Something about having just that one light on in the room shining on your book will make you ve-he-heh-ry sleepy.

*

I started running late at night. When I get back I take a shower and hit the sack. It puts me to sleep instantly.

*

I turn on music I enjoy that my mind can focus on. Puts me to sleep almost every time.

*

Reading works well for me if I can't sleep. It's a 'replacement behaviour' for masturbating to porn. I've also worked hard at telling myself that missing sleep for a night isn't the end of the world. That really helps.

*

My approach was consistent exercise, as much sunlight as possible (natural melatonin), and abiding by the 'use your bed only for sleep and sex rule' – which for single me translated to 'use your bed only for sleep'.

*

If restlessness gets super bad, I actually do Kegel exercises [pelvic-floor exercises], even in the middle of the night. They tend to ease the longing/withdrawal by redistributing the energy, or whatever. The muscles get a little attention for a while with the kegeling and tend to 'go back to sleep'.

*

Get up earlier. It's also the best time to fit in a workout. You'll be tired by the time it is time to go to sleep in the evening.

*

What works for me is to wake up and go to bed at regular times, and to avoid intense physical activity immediately before sleep.

*

Lie on your back and list everything that you are grateful for. When I first started doing this, my gratitude list was long. Now, I barely get through being thankful for my friends and my dog and I'm dead asleep.

Some guys have benefitted from supplements, herbal teas, such as camomile, and other home remedies.

Triggers

One man described triggers as, 'the external factors that make you think about porn.' Common triggers include: TV and movies with erotic content, porn flashbacks, morning wood, use of recreational drugs or alcohol, words that remind you of a porn site/actor and suggestive ads. Said one guy:

The only thing that feels worse than relapsing is relapsing because you got too drunk or high to control yourself.

But states of mind can also be triggers: boredom, anxiety, stress, depression, loneliness, rejection, fatigue, frustration, anger, failure, feeling sorry for yourself, desire to reward yourself for an accomplishment, overconfidence, jealousy, and being hung-over.

Procrastination also triggers many a relapse. The result has been dubbed 'procrasturbation'. Keep a list of things you want to accomplish as well as a list of risk-free activities for those moments when you just don't have the motivation to do something productive.

Obviously, triggers are somewhat unique to each brain. Here are some less common ones: hot showers, too much sugar or too many carbohydrates, too much caffeine, Russian bride ads, websites like Stumbleupon, YouTube, Imgur and Reddit, stalking old romantic interests on Facebook, being on the computer for a long time without hourly 15-minute breaks, videogames, a full bladder, self-absorption, handling your genitals and clothing that rubs them, masturbation, smartphones and hunger.

Triggers are both problems and solutions. They can drive you mad during rebooting (at first), but they also show you when to be on high alert. Some rebooters take the drastic measure of unhooking from the internet for a month or two.

The bad news is that trigger-pathways sometimes stay around for a long time, even after you are fully rebooted. They do weaken. For example, an alcoholic who has been sober for 20 years may no longer be triggered by beer commercials. Yet if he drank a beer his sensitized pathways might light up causing him to lose control. Similar things happen to former porn users. They become immune to cues that were formerly risky, but if they use porn again they may binge.

You will need to be mindful of triggers for a long time, so it pays to work out what they are and be attentive. You also need to have a predetermined response for when you face one.

These men explain how they use triggers to their advantage:

> *One day I am browsing when my parents decide to go out. I didn't want to go, so I keep doing my stuff. When they close the door, something clicks in my head. Suddenly, a big desire for porn pops into my mind. I was turned on by the closing of a door! That was the first time I realized that 'parents leaving home' is a trigger for me. Obvious, but I hadn't noticed it. Now, every time my parents leave the house, I go out for a walk, call a friend or just stop using my computer and do something useful.*

*

My biggest problem was always lying in bed with my iPhone. Definitely an easy access trigger. I also used porn almost exclusively at night. Now, at 11 pm, I shut down all electronics, put my laptop in my closet, set my alarm and put it far away from my bed. I go wash my face, brush teeth, etc. I then journal or read until I'm tired. This takes away all triggers and temptations. Instead of leaving my mind to wander I read a book.

When you feel The Urge, ask yourself:

– What emotions am I feeling?

– What time is it?

– Who else is around?

– What did I just do?

– Where am I?

– What could I do instead that would meet my needs?

Could you go for a run, prepare a healthy snack, learn a new word in another language, work on that novel you've been meaning to write or call a friend? Choose a response that furnishes a sense of accomplishment, connection or self-care.

Once you have identified the trigger and decided upon an alternative reward for that situation, record your plan, 'When ____ occurs (trigger), I will ____ (new routine), because it gives me ____ (the reward)'. Rewards might be more energy, something to be proud of, better health, feelings of happiness, the satisfaction of taking care of business, increased confidence, better mood, improved memory, reduced depression, desire to socialise, better erections, and so forth.

If you consistently 'face and replace', your new behaviour will eventually be automatic. If for some reason you can't act on your new routine, do what Olympic athletes do and visualize yourself acting on it in minute detail.

Emotions

People who quit porn often remark that they feel more emotions. Why is this a challenge? Because unfamiliar emotions can be overwhelming at first, especially if they are unwelcome.

> *From unexplainable happiness to crippling sorrow, I now experience emotions like never before. Masturbation to porn had numbed these extremes, leaving me dull and complacent.*

*

> *You will encounter emotions you haven't felt for years, maybe never. Girls that didn't matter to you before will all of a sudden be the centrepiece to your f--king life. That exam you failed? You don't blow it off; you worry about your grade; you worry about the final coming up in two weeks. And this is good; hell it's great. This is the suffering that you learn from, that lets you grow. But it will hurt. At points you'll feel sad, confused maybe even depressed. Don't fall into that trap. Emotions pass, memories fade, and you will come out stronger. Remember, you have years of emotional growth and maturity to come into. It might not be easy, you may not feel comfortable, but it is worth it.*

As this guy pointed out, you can't have the highs without being willing to face the lows:

> *Porn, at its core, is much like any other addictive substance or behaviour. It DOES numb your pain, but therein lies the problem. You see, you can't selectively numb an emotion or feeling without numbing all emotion and feeling. So even though these things dull the sting of vulnerability, loneliness, sadness, disappointment and fear, they also dull the positive range of emotions like happiness, hope, joy and love.*

Chaser

The term ‘chaser’ is often used to describe intense cravings that sometimes follow orgasm. Like withdrawal symptoms, the chaser can derail a reboot in a heartbeat.

The chaser effect is counterintuitive but real. I had little urge to fap while my girlfriend was out of the country, but as soon as we started having sex again my urges to use porn became stronger.

*

I sometimes feel hornier in the days following orgasm. At such times, I also have strong feelings of attraction for other women.

Some guys also notice a chaser effect after a wet dream; others don’t. In any case, these intense, often unexpected cravings after orgasm can hurtle an unwary rebooter into a binge:

After rebooting I hooked up. We headed to bed. I start tearing clothes off and I’M HARD STRAIGHT AWAY (woohoo!). We have sex for about 2 and a half hours, which HAS to be a record for me. But I experienced the dreaded chaser effect. I was so horny the next morning that I jerked off while she was in the shower. I felt really depressed later that day. In fact, I masturbated quite a few times.

*

After three months porn-free, my new girlfriend and I got each other off, and now, a day or two later, I’m definitely noticing powerful urges to masturbate and look at porn again. It seems so contradictory, but it’s happening. I’m masturbating more and I even looked at homemade porn yesterday.

*

I noticed that after bingeing on porn, you really need to push yourself to get back on track because orgasm makes you hornier. The first three days are difficult.

The chaser is probably an amplified version of the natural neurochemical swings that can follow any climax. Happily, sometimes the chaser can help kick-start libido after a long flatline:

> *The morning of day 68, something very strange happened which I never experienced as a teen: a wet dream. Looking back on this event now from 91 days, I feel like it was the changing point for me, almost like a re-birth. Since then I really started to see the benefits of rebooting. I'm more energised and my ED seems to have cleared up.*

People sometimes report that the chaser effect eases over time. In fact, the disappearance of extreme chasers can be a sign that the rebooting process is progressing:

> *Ever since I masturbated Sunday night with my first full blown hard-on using minimal stimulation, no fantasy and surprising endurance to orgasm, I have been feeling a bit more energized and horny. Clear-headed, no real chaser. It's safe to say I am on the upswing.*

This husband found a particularly good use for his chaser:

> *Being that we just made sweet love last night, my wife decided to tip toe down the hall, and see what I was looking at this morning. (She knows about the chaser effect.) So I did as any warrior would do. I showed her exactly what the chaser effect really is! I chased her into the bedroom to demonstrate that I only chase HER now. Left late for work...Worth it!*

Disturbing dreams, flashbacks

People often remark that they recall their dreams better after quitting.

This can be enjoyable or not:

> *I have noticed that my dreams are back. When I was fapping like crazy during the last 10 years, I honestly didn't have one single dream, or only a few.*

Vivid dreams seem to be a normal part of the mental housecleaning process of unhooking. Often people dream they are relapsing as the brain tries to activate familiar brain loops, but eventually such dreams fade.

> *I've been having the most f--ked up dreams, the sort of shit I don't feel comfortable telling anyone about. I understand it's just my mind working its way through withdrawal, but I hope it ends soon. I could really go for a good night's sleep.*

Porn flashbacks, too, are common and may cause distress:

> *There are so many times I can't see a stranger or friend for who they are. I just see flashes of them naked, girls or guys. I totally understand that normal people fantasise about someone they really like (a teenage boy who can't pay attention in class because he's thinking of how his teacher looks naked, for instance). So it's not the fact that I'm mentally undressing people that's upsetting. It's the fact that it happens SO OFTEN and in response to such random occurrences, triggers and unwanted triggers. Even when I don't find the person attractive, or I don't want to find them attractive. Such as elderly people or younger children. My mind is just so on the fritz. I can deal with it if I'm just passing someone on the street and can quickly snap back and forget about it. But if it's someone I'm actually engaging in a conversation with it almost escalates into a panic attack. I end the conversation quickly and find a quiet place to calm myself.*

Best to treat flashbacks like dreams. That is, regard them as mental housecleaning rather than evidence that the reboot isn't working. Just acknowledge them and let them pass without assigning them any meaning. Tune into your senses and shift your attention to what is going on around you. Relax and breathe deeply. Note: Those with OCD tendencies may have a harder time dismissing flashbacks. They assign significance where there is none. They may benefit from professional help.

Shame cycle

Many of today's internet porn users grew up with online erotica and are quite blasé about its use. If they feel shame, it's about their inability to control use, not about porn content or use. Their shame evaporates as they regain control.

However, if your porn use is associated in your mind with parental/ spousal/religious shaming, threats or punishment – or tangled up with rigid ideas about masturbation – then you may need help reframing your porn use and your self-image.

Dopamine rises sharply – especially in teens – when anticipating doing something novel or taking a risk, including doing something forbidden. This neurochemical spur urged our adolescent ancestors to risk embarking for new territories and avoid inbreeding. This makes 'forbidden fruit taste sweetest.' To repeat, research shows that anxiety actually increases arousal.[239]

With all that extra dopamine screaming, 'Yes!' it's easy for the primitive reward circuitry of the brain to overvalue condemned activities. They register as hyper-arousing, which means they also offer temporary comforting oblivion when shame strikes. This explains how some users fall into a 'shame-binge-shame' cycle.

It would be reckless to claim that the full story is known, as far as the brain chemistry of addiction is concerned. But this biological frame of neuroplasticity – and the computer analogy in the idea of rebooting – gets much closer to the facts of the matter than either conservative angst about visual sexual stimuli *per se* or liberal complacency about the harmlessness of porn.

Interestingly, people (including religious ones) on the forums we monitor often make rapid progress in rebooting after they re-frame their porn challenge in biological terms:

> *I no longer see my addiction as the influence of demons or the natural expression of my wicked sinful heart, but as a very human, very natural (albeit misplaced) desire for sexual intimacy. It was a bad habit, reinforced by neurochemicals, but nothing mysterious or ethereal. I realized that I already had the power to control my actions. And so I did. I realized that the life I wanted to lead was incompatible with porn use, so I made that decision. 'Simply' doesn't mean easily, of course.*

Success in this area has given me the confidence to tackle other challenges. Since I've started this 90-day streak, I've lost over 20 pounds, started swing dancing, joined a band, and I'm seeing a girl. I'm not talking about superpowers here. All this potential was already inside of me, trapped behind my porn habit. I look in the mirror, and I don't feel regret. I think this is how normal people feel. I hate the amount of time I've wasted feeling guilty and ashamed, but I now look forward with a clear conscience. I love my life.

The key seems to be to channel lots of energy into constructive action and self-compassion – and away from excruciating, yet arousing, inner battles.

Intermittent use

The risks of very frequent porn use are familiar to many users. Less well known is the fact that intermittent use (for example, two hours of porn bingeing followed by a few weeks of abstinence, rinse and repeat) can increase compulsion to use. The reasons are biological and there is much addiction research on intermittent use, including studies involving drug224 and junk food use.[240] Periods of abstinence (2 to 4 weeks) lead to neuroplastic changes[241] that don't occur in other users. These alterations increase cravings, heighten stress responses[242] and can produce severe withdrawal symptoms.[243]

So, bingeing after interims of abstinence can hit you harder, perhaps because of the heightened intensity of the experience.[244] In short, intermittent bingeing can do the same thing as continuous use, and in some cases do more.

It is important for anyone trying to quit porn to understand this phenomenon and recognize why consistency (even with the occasional single-use lapse) makes quitting far easier than intermittent bingeing. This phenomenon may also explain why users who report using less porn (religious users who may be intermittent users, for example) may also report higher than expected scores on porn addiction/compulsivity tests.[245]

Common Pitfalls

Edging

Edging is masturbating up to the edge of orgasm, repeatedly, without climaxing (often while browsing porn). This practice is not uncommon on 'nofap' forums where people sometimes persuade themselves that avoiding ejaculation is the issue and porn use is not.

A rebooter explains why edging is unwise:

> *Instead of achieving orgasm and ending it, you train your brain to be bathing in arousing neurochemicals for hours. It's the worst thing you can do, bar none. The worst. I think most of us weren't addicted to porn, but rather to edging to porn.*

In men, edging stresses the prostate. Also, it does not prepare you well for sex with a real person, as it's typically tied to prolonged visual stimulation, rapid-fire novelty, clicking from scene to scene, and your own hand (or sex toy).

Dopamine is at its peak on the verge of orgasm. Therefore edging also keeps dopamine as high as it can naturally go, perhaps for hours. The brain is getting strong signals to strengthen the associations between arousal and whatever the viewer is watching, be it fetish or merely screen. Chronically elevated dopamine also risks causing addiction-related brain changes, such as decreasing sensitivity to pleasure.

In the pre-internet days, guys would usually masturbate, climax and be done within a matter of minutes. Orgasm sets off neurochemical changes that inhibit dopamine for a while. That normally spells some relief for sexual frustration. But placing your foot on the dopamine gas, without ever hitting the brake, results in a continuous state of cravings without satisfaction:

> *What really got me going down the porn death path was when I changed my habit from doing it for the orgasm to doing it for the sensation leading up to the orgasm.*

Be aware that, at first, you may not find a single climax without porn satisfying, just as you may not find masturbation without porn stimulating enough to climax. This is because your brain is not feeling rewards normally. No need to force yourself to climax. Be patient.

Fantasising

Research on mental imagery indicates that fantasising or imagining an experience activates many of the same neural circuits as performing it.[246] Most people report that avoiding fantasy early in a reboot is very helpful – including during sex with a partner – because it reduces cravings. However, if someone has little sexual experience, it may *eventually* be helpful to engage in realistic fantasy about real potential partners in order to help rewire the brain to real people (instead of screens). After all, humans have been engaging in sexual fantasy for eons. Avoid placing real people into your favourite porn scenarios, however.

Fantasy is regarded as something risky because at first our fantasies are nothing but modified versions of porn scenes. The fact that your brain is somewhat numb to pleasure and creativity means you can't clearly imagine how that hot girl would look naked. Or what loving, caring sex would be like. Solution? 'Let's just recall that porn scene that kept us edging for hours'. There lies the danger. A healthy person who has natural fantasies about someone will not get himself into trouble, while a porn addict who keeps fantasising based on his porn past will only make things worse. My opinion is that once you start to recover, if your mind starts fantasising on its own, without being extreme or unrealistic, you should allow it. Don't necessarily reinforce the fantasy, but allow it to be.

*

If a fantasy even remotely resembles porn, it should be off the table during a reboot. Two reasons:

(1) Porn fantasies can lead to relapsing.

(2) They can reinforce the screwed up neural circuitry that we're attempting to undo by rebooting. Your brain doesn't make a distinction between imagery that comes from a computer screen or inside your own mind, so running porn-like imagery through your brain is little different from watching porn.

Now that said, I don't think that all fantasy is bad and counterproductive. I've found that during rebooting, pretty much for the first time in my life, I've spontaneously begun to have another type of fantasy that involves intimacy but not sex – things like exchanging smiles, holding hands, giving back or foot massages. I know that may sound corny, but

these fantasies are actually very vivid and enjoyable. BTW, I never edge or masturbate during such fantasies (if I did they'd probably become sexual).

Using porn substitutes

This is another easy way to derail your reboot. If you're trying to quit porn, it's easy to rationalize looking at, say, pictures of models in thongs instead. After all, that's not porn, right? Actually, the primitive part of your brain *doesn't know what porn is*. It simply knows whether something is arousing (to you) or not. (Your brain is in good company. In 1964 Justice Potter Stewart of the US Supreme Court famously claimed that, while he couldn't define pornography, he knew it when he saw it.)

Opinions as to whether bikini pics constitute porn are irrelevant. What really matters are spikes of reward-circuit dopamine. The question to ask is, 'What type of brain-training led to the problems I'm experiencing, and am I repeating it?'

Would browsing Imgur because you find it arousing activate sensitised addiction pathways and reinforce your porn problem? Sure. You are clicking and surfing in pursuit of two-dimensional sexual novelty because your brain is hungry for stimulation. It can slow your recovery. On the other hand, bumping into hard-core images, then immediately closing the page actually strengthens your willpower. Remember, the goal is to reset the brain so it becomes excited by the real deal.
Internet porn addiction is not an addiction to the naked or erotic; it's an addiction to screen novelty. One guy summed up what he learned:

Why are you browsing YouTube videos of girls dancing in shorts? What's the point of sexting, webcams, phone sex, fantasising constantly, erotic stories, browsing dating apps (without the intention of contacting them), typing pornstar names on image search, checking out social media, etc? All of these activities reinforce the same pathways you're trying to weaken. They keep your mind occupied with sexual thoughts, tits, asses, f--king, getting off, hot chicks, etc. They make rebooting harder and more painful. Either try to get laid (approach potential partners, set up dates, flirt, contact friends, go out) or do something completely unrelated to sex (work, study, exercise, hang out).

Forcing sexual performance prematurely (ED)

Traditionally, both men and women assumed that turning up the heat is the solution to sexual sluggishness in a partner. However, those with porn-related sexual dysfunction often find that they heal faster if they allow their libido to reawaken naturally, free of sexual performance demands. One man described his girlfriend's support:

> *She has been so amazing. I told her that I would occasionally use porn fantasy to stay hard, and she told me that she'd rather I went soft than use porn. Knowing that actually made it easier, and I haven't even thought of porn since we had that convo a few weeks ago. She also refused to let me take any sort of ED drug, as she wanted me to sort this out naturally. Here's my advice:*
>
> 1. *Talk to your partner. It is by far the biggest help.*
> 2. *Take your time and go at a pace you are comfortable with.*
> 3. *Supplements had no effect what-so-ever.*
> 4. *Don't fall into the trap of looking at porn even if you don't plan to binge.*
>
> *Funnily enough, my girlfriend went through a similar phase a while back of viewing too much porn and ending up finding that only girl-on-girl action would get her wet even though she is not lesbian. So she also had to give up porn, and fully understood what I was going through. Sure, we've had some lows. She's had some insecure feelings. I've had some terrible evenings of feeling inadequate and useless, but in the end we talked things through and came out stronger. Then, last weekend I managed to actually get and stay hard enough for sex. This is a huge step forward for me, the start of a new sexual adventure, and it's fantastic.*

If orgasm sets off noticeable neurochemical ripples (the chaser) or sends you into a binge, don't push yourself to finish for a while. Keep your sexual activity gentle and low-key, that is, free of all performance pressure, while your sensitivity to pleasure returns naturally. It is better to leave wanting more than to exhaust your sexual desire.

If necessary, ask your partner not to play porn star in an effort to heat you up prematurely. You can make up for lost time once you return to your studly self.

Only a matter of weeks ago I had almost resigned myself to never being able to achieve climax during penetrative sex. Last night I had sex with my partner twice and reached climax both times! Once we started kissing and touching each other, I couldn't hold back on my urge to penetrate her. It felt so natural. The sensitivity in my penis has definitely returned, plus I feel there's more to come.

Assuming a fetish is permanent

The belief that 'I can't help my fetishes; that's just who I am' can become a serious stumbling block to quitting internet porn because it can feel like you're abandoning your only hope of sexual fulfilment. The fact is, only by process of elimination will you know whether you are dealing with a porn-induced superficial 'fetish' or a fetish arising from the core of your sexual identity.

Obviously, if a fetish disappears during the months after you quit porn then it wasn't integral to your sexual identity. In the meantime, cravings for highs can deceive you about where happiness lies. Said one young guy:

In summer 2011 I developed a new fetish, and oh god I could feel the dopamine in my brain. I was so happy and excited when watching this new type of porn that my body would shake. Since then I have been a lot less happy and have never gone back to normal.

Confused by the combination of past thrills and present dissatisfaction, some porn users escalate through a series of increasingly extreme genres. Others wonder if their sexual orientation has changed as they find new things intensely arousing and earlier things less so. Some desperately seek certainty by furiously masturbating to different kinds of porn in an effort to figure things out. Compulsive checking can drive them deep into an addiction or OCD-like behaviour without clarifying anything. Still others try acting out their fetishes with little satisfaction.

Tip: If you're in a hole stop digging. Rule out excessive porn use as a cause *first*. Rest don't test. Quit porn and porn fantasy for a few months. Watch out, because withdrawal discomfort or flatlining may persuade you that you need more extreme scenarios to find satisfaction,

even though satisfaction actually lies in a balanced brain (the opposite direction). Addictive activity tends to fuel further activity rather than satiating it.[247]

> *Pornography made me able to become aroused only when I imagined extreme images. I did a lot of extreme things with female prostitutes, but was left wholly dissatisfied. Even with transgender escorts, nothing they did aroused me. I had to force myself to become aroused by thinking of extreme porn. Also, I was switching between different sexual activities every few minutes just as I switched between videos at home. During my porn use, I was unable to be turned on simply by being near a naked woman (something I used to love more than anything, and now love again). Today, when I am intimate with a woman it's an actual connection, an exceptional, awesome feeling. No forced fantasies.*

Today's internet porn users are demonstrating that human sexuality is far more malleable than anyone realized. Viewers can use today's hyper-stimulating content to produce supernormal arousal states, and maintain them for hours. As overconsumption leads to desensitization, the brain seeks more dopamine via novelty, shock, forbidden content, kink, etc. That's when earlier porn tastes may no longer do the job.

Clearly there are early windows of development, during which deep associations can get wired in more or less permanently. And of course, during puberty, all erotic memories gain power, and are reinforced with arousal. Avid porn use in teens, whose brains are highly plastic, can cause sexual tastes to morph with surprising swiftness. Research shows that the younger the age people first start to use porn, the more likely they are to view bestiality or child porn.[248] In an informal 2012 poll of (mostly young) people on r/nofap, 63% agreed that, 'My tastes became increasingly "extreme" or "deviant"'.[249] Half were concerned; half weren't. Regardless, porn fetishes often dissipate after quitting.

The bad urge

The ideal time to deal with a bad urge is before it shows up. When you first quit, plan ahead:

> *Try to be home as little as possible. If you can't think of anything to schedule for the first few days go to a library, a bookstore or park to read. Not being at home, or a place where*

you usually fap, will be incredibly helpful in getting past the first few days of withdrawal throes.

Make a list (now) of reasons you are avoiding porn and consult it when The Urge arises. Better yet, write a note to yourself that you can read when The Urge arrives:

You start some edging. Now there is no looking back. A little more ... then a little more ... aaaand you're done. Most likely the orgasm won't be very intense. You will feel a sense of relief more than anything else. 'Now I can go back to my work', you will say. 'That wasn't so bad. I don't feel any shame. There's really no point denying yourself to such an extreme'.

In about an hour, you will start feeling the energy drop, the onset of a mental fog. This will develop into anxiety. The anxiety is not because of the fapping. It's your natural response to the energy drop. Nothing bad happened to you. No one told you off. You didn't have any bad thoughts. Everything was ok until an hour ago. Now, you're feeling slightly unwell. You can't concentrate so well. You wish you didn't have to get any work done. You just feel like sitting back and watching TV.

By the end of the day you will have not completed your tasks for the day. Your defence mechanisms for procrastination will kick in. Your mental state is now completely at the mercy of external factors. How much work can you accomplish the next day? Will you run into any roadblocks? Depression kicks in. Your mind does not want to engage with anything in case it makes things worse. You don't want to meet people. Your brain is in shutdown mode. You decide not to give in again.

Next, make a list of what you will do instead when The Urge arises.

Some people use the 'Red X' technique:

I totally stopped fantasising about porn about four weeks ago. Whenever a porn flashback enters my mind I visualise a big red X over it and imagine a loud ambulance siren. If the porn image is insistent, I visualise exploding it in my head. The key is to do it immediately. The technique becomes more automatic with time.

If you don't know what else to do, wait and do nothing. Think to yourself, 'Here are cravings. They came out of nowhere and they have no real power over me. I am not my thoughts; I did not summon them; I do not want them; and I do not have to act on them.' Typically, the thought will vanish without a trace (for a time).

All urges die down, usually within quarter of an hour.

Once you learn that you are bigger than your urge and it always passes by, you'll be well on your way to ridding yourself of porn use. In my previous attempts, I would always give in to the one bad urge. Once I finally fought it I realized that I could beat any bad urge that comes. In that very moment when you feel you're weakest, when you feel like the urge is gonna defeat you, that's the moment in which you need to stay strong. On the other side of that urge is your breakthrough.

Here are other tips that work for some people:

Your brain will try to rationalize porn use because it desperately wants it. The key here is not to argue with your brain. Simply acknowledge that you're having the thought, or answer, 'No'.

*

I just kinda hung my junk over in the sink and ladled cold water over it with my hands. It definitely kills the cravings. Also helps with blue balls.

*

I try to focus on drawing the sexual energy upward, into my chest and upper body to ease the pressure in my pants. It makes me feel really powerful. It relieves the need to masturbate, and kind of gives me this super 'ready for action' feeling. Like I could tear down a house if I needed to, or throw a girl around and have my way with her, in a consensual, playful way of course. I like it.

*

Do you keep giving yourself an excuse like 'I will do it one last time' or 'Today is the last time'? Change it to 'Just today I am not doing it'.

*

Live as if porn didn't exist. Completely forget about it. Don't spend your day fighting urges. Don't 'try hard'. Be OK with the idea that you will never watch porn again in your life.

When The Urge shows up, and you feel like you have no control, turn off your device and think things through before acting on it. Even if you act on it afterward, you will do so consciously and that is the first step to changing behaviour.

Never quit. I don't care if you reset every other day for a whole month or two. If that's the best you can do, you're now using porn half as often as you did. The most inspiring story I ever saw was of a guy who had a 15-day streak...after 3 years of trying. As long as you keep coming back, because you know it's important for your own good, you cannot fail. It is only a matter of time until you reset your neural pathways and break free.

Common Questions

How long should I reboot?

Many websites that link to www.yourbrainonporn.com say it prescribes 60 or 90 days, or eight weeks, etc. In fact, YBOP suggests no set period, as the time needed is dependent on the severity of your porn-related problems, how your brain responds, and your goals. Time frames in rebooting accounts are all over the place because brains are different, and some men have stubborn porn-induced ED or DE.

Think of a reboot as discovering what is really you and what was porn-related, whether it be sexual dysfunctions, social anxiety, raging horniness, ADD, depression, or whatever. Once

you have a clear understanding of how you were affected by porn, you can steer your own ship.

Can I have sex during my reboot?

It's up to you. Some people find a temporary time-out from all sexual stimulation gives the brain a much needed rest and speeds recovery. On the other hand, daily affectionate touch is always beneficial, with or without sex. If you feel like the chaser effect is knocking you off balance after sex, you might try gentle lovemaking without the goal of orgasm for a while. It gives you the benefits of intimacy while still allowing your brain to rest from intense sexual stimulation. However, if a reboot is taking a long time, sex with a partner sometimes helps return libido to normal.

Again, if you think you are experiencing porn-induced ED, you may see better results if you don't force any sexual performance until you feel like your erections are arising spontaneously with your partner.

Should I eliminate masturbation while rebooting?

Not necessarily. You can try cutting out porn, porn fantasy and porn substitutes first. For some people that is enough to allow a return to balance. Others find that masturbation is a powerful trigger for activating porn pathways, so they do better if they give it a rest for a while.

> *Whenever I told myself I would only masturbate and never go back to porn, it wasn't long before masturbation became kind of boring. I would fantasise about real-life memories in the beginning, but my brain would quickly jump to memories from porn scenes and unrealistic fantasies. From there it would lead to erotic fiction, to amateur images, and then straight back to hardcore.*

On the other hand, when porn-induced ED is present, the *majority* of rebooters find that they need to drastically reduce masturbation and orgasm (temporarily). When you have a pathology, you usually need to do more than just eliminate the cause – in this case porn use. For example, you don't generally break a leg by putting weight on it. However, once it's

broken you have to cast it, use crutches and eliminate walking while you heal. Same goes for porn-induced ED. You don't have to wear a cast, but you need to give your brain time to heal, free of intense sexual stimulation. That said, longer is not necessarily better, and some find it helpful to reintroduce occasional porn-free masturbation after they have taken a long break from it.

Note: You don't want to force yourself to masturbate using fantasy or other aids if it isn't yet happening spontaneously.

How do I know when I'm back to normal?

Obviously, there's no simple answer to this question as goals differ for each person. Common goals include: return of healthy erections, ease of orgasm during partnered sex, normalizing libido, diminishing porn-induced fetish tastes, managing cravings, and so forth. It's not uncommon for people to experience continued improvements long after the end of rebooting. These are some encouraging signs:

- You feel like flirting with potential mates, who look a lot more attractive.
- You are getting morning wood (or 'semis') frequently.
- You can orgasm without an intense chaser effect.
- Intercourse with a partner feels fantastic (Note: You may have a bit of premature ejaculation or delayed ejaculation early on. Practice makes perfect.)
- Your libido changes:

My libido went missing on and off for 6 months. Yet when it returned, it was a more wholesome libido. The desire for porn perving and sexually staring at women was gone.

How do I know that I don't just have a high libido?

Give up porn and porn fantasy and see what your libido is like some weeks later. It has been surprising to witness that most rebooters have an easier time eliminating masturbation than they do porn. For many guys, masturbation is simply not that interesting without porn, and they are amazed to discover that porn, not high libido, was driving their constant search for relief. Certainly, if you cannot masturbate without internet porn, or have a partially erect

penis when you do, you are not horny or in need of 'release'. Your brain is seeking a fix: the relief of a temporary neurochemical high.

The confusion between cravings for porn use (evidence of brain changes and pathological learning) and so-called 'high sexual desire' gives rise to some lively debates in the popular press. However, scientists have shown that cravings and natural high libido are distinct. Studies find little overlap between those who meet the threshold for problematic sexual behaviour and those with genuinely high libido.[250] The first is a dysfunction (diagnosed as a 'preoccupation') involving hyper-reactivity to cues (sensitization) and a lack of inhibitory control (hypofrontality). In the case of porn users, these symptoms are often paired with a lack of desire for partnered sex. High desire, on the other hand, is simply enthusiasm for sexual activity, including partnered activity.

CONCLUDING REFLECTIONS

Nothing ever becomes real 'til it is experienced. John Keats

If you suspect your porn use might be adversely affecting you, by all means make a simple experiment: Give it up for a time and see what you notice for yourself. There's no need to wait until experts reach a consensus. Quitting porn is not like engaging in an untested medical procedure or ingesting a risky pharmaceutical – situations where definitive research is not only possible but necessary. If you try to do this and then experience discomfort you might be sorely tempted to wonder if porn addiction is a myth. The internet being what it is, you will be able to find plausible people who say just that. Even your doctor might dismiss your concerns. Any scepticism will seem more credible if abstaining from porn gives rise to negative effects, like anxiety or reduced libido. For what it's worth, such symptoms and your desire to look at porn, and to find a rationalisation for doing so, could be telling you something important about how you have come to use the ubiquitous stimuli of the internet to manage your mood. If you aren't sure if porn is a problem for you, just stop, and pay attention to what happens to you.

Quitting internet porn is the equivalent of removing refined sugar or trans-fats from your diet. It is simply the elimination of a form of entertainment that no one had until recently, and everyone got along without. Giving up porn is a kind of historical re-enactment, where you get to live like almost everyone in history has ever lived. As one porn user said:

> *Here is the schema:*
>
> 1. *Exciting, but bad-in-long-term behaviour is introduced for money.*
> 2. *People get hooked.*
> 3. *Precise, scientifically backed-up research takes decades to kick-in.*
> 4. *Hooked people start to get educated.*
> 5. *They start behaviour-elimination.*
>
> *Problem is that this whole cycle is so damaging. Cigarettes were (widely) introduced in the early 20th century and took decades to regulate. We now know that certain types of*

foods are harmful. Yet, with food we are still in phase 2-3. Guess where we are with pornography? The useful scientific research is barely a few years old.

A consensus about the risks of high-speed internet porn could be awhile off regardless of the efforts of urologists who have publicized their concerns about porn and sexual dysfunction at annual conferences of the American Urological Association,[251] including a US Navy team.[252] This is despite the warnings of hundreds of sexual health experts like UK medical doctor Anand Patel, who advises that, 'Whilst it is difficult to withdraw from pornography, the return of normal sexual excitement and erectile function is totally possible without medication'.[253] Sadly, the sexologists who insist porn is exclusively 'sex positive' will need longer to get up to speed.

A young psychiatrist, himself newly recovered from porn-induced sexual dysfunction,[254] pointed out that the internet porn phenomenon is only 10 or 15 years old, and way ahead of the research. He notes:

Medical research works at a snail's pace. With luck we'll be addressing this in 20 or 30 years ... when half the male population is incapacitated. Drug companies can't sell any medications by someone quitting porn.

Maybe we don't have to be quite that pessimistic. Already there are some three dozen brain studies (and 12 reviews by addiction neuroscience experts[255]) not to mention dozens and dozens of other studies linking porn use and problematic porn use to sexual dysfunctions, lower arousal with real partners, hyper-reactivity to porn cues, and reduced sexual and relationship satisfaction. They align neatly with the self-reports I've been tracking for years.

There's certainly more to learn about internet porn's effects. But while the research continues to unfold, trust your own experience. As one ex-user wrote:

Once you've experienced the truth about porn for yourself you can no longer be deceived by propaganda about porn, whether it comes from the religious, the liberals or the porn producers. They all have their agendas, but you have knowledge and can create your own opinion based on what is best for you.

Understand the Science of Misinformation

If you're wondering why there's not yet a consensus on the effects of internet porn despite the swell of warnings from those affected and their healthcare givers, you may find the history of the Tobacco Wars instructive. Years ago, most everyone smoked, including movie stars on screen. People loved puffing. It calmed the nerves, offered a predictable buzz and looked sophisticated. How could such a wonderful activity *really* be detrimental? Was nicotine *truly* addictive? When tar showed up in cadaver lungs incredulous smokers preferred to blame asphalt.

Causation studies could not be done because they would have entailed creating two random groups of people and asking one to smoke for years while the other refrained. Definitely unethical. Meanwhile, other kinds of evidence mounted that smoking was causing health problems and that people had great difficulty quitting: correlation studies, anecdotal reports from physicians and patients, etc. Prospective studies, which compare a group of similar subjects whose smoking habits differ, took decades.

During this time, studies fostered by the tobacco industry found no evidence of harm or addiction. Predictably, every time new evidence of harm appeared, the industry trotted out its 'debunking studies' to create the impression that the authorities were in conflict – and that it was far too soon to quit smoking. The head of the Tobacco Industry Research Committee said, 'If smoke in the lungs was a sure-fire cause of cancer we'd all have it. We'd all have had it long ago. The cause is much more complicated than that'. He also dismissed statistical connections as not proving 'causation'.

Ultimately, however, reality could not be denied. Smoking claimed more and more victims. At the same time, addiction research became more sophisticated and revealed the physiology of how nicotine produces addiction. In the end, the tobacco industry's spell was broken. These days, people still smoke but they do so knowing the risks. Efforts to paint a false picture about the harmlessness of smoking have ceased.

Meanwhile, much unnecessary damage had been done. Critically important health information, which should have taken a few years to become common knowledge, instead took decades – while fabricated uncertainty protected tobacco profits.

Big Tobacco's campaign to cast doubt on the link between smoking and disease is now a classic case study in a science called agnotology: *the study of the cultural production of ignorance*. Agnotology investigates the deliberate sowing of public misinformation and doubt in a scientific area. As Brian McDougal, the author of *Porned Out*, put it,

> *It's hard to imagine that a whole generation chain-smoked cigarettes without having any idea how harmful they are, but the same thing is happening today with online pornography.*

Is internet porn the new smoking? Almost all young men with internet access view porn and the percentages of women viewers are growing. Whenever something becomes the norm, there's an unexamined assumption that it must be harmless or 'normal', that is, that it cannot produce *abnormal* physiological results. However, that proved not to be the case with smoking.

And, just as with smoking, causality studies cannot be done. It would be unethical to create two groups of kids and keep one group as 'porn virgins' while setting the other group free on today's internet porn for years to see what percentage lose attraction to real partners, can't quit, become socially anxious, or develop porn-induced sexual dysfunctions and extreme fetish tastes.

Studies that follow porn users and non-users over years may never be done, especially in those under 18. Even finding a group that doesn't use porn and another group who accurately report their porn usage would be challenging. In contrast, studying smoking was easy. You either smoked or you didn't, and you were perfectly happy to say what brand of cigarette, how many per day, and when you started.

Meanwhile, other kinds of evidence, formal and informal, are mounting that some internet porn users experience severe problems, as recounted throughout this book. Reputable researchers are reporting associations between internet porn use and depression, anxiety,

social discomfort, addiction/compulsion, fetish and escalating tastes, sexual and relationship dissatisfaction, and low desire for real partners, as well as increased concerns about sexual performance and body image.[256]

Happily, people are reporting surprising recoveries from various symptoms after they quit porn. However, addiction treatment facilities are seeing increases in internet porn-facilitated addiction. Lawyers are noting a rise of divorces in which internet porn use is a factor, a claim supported by recent research on porn use and increased likelihood of divorce.[257] And a 2016 meta-analysis has correlated porn use with sexual aggression.[258] Correlation does not amount to causation. But do we want to disregard possible side effects in pursuit of a nonessential activity like screen-induced climax?

The Rearguard Strikes Back

As always with a new field of science, progress has also elicited a degree of vocal resistance from the rearguard. The media and 'sex-positive' sexologists regularly characterise efforts to understand and explain the potential effects of internet porn on users as either attempts to pathologise diverse sexual behaviour or sexual shaming, claims that distract us all from the scientific evidence.

Nor have these folks accepted the preponderance of the neuroscience research on porn users' brains. Let's take a look at one of the more pervasive streams of opposition, with the goal of helping you to become a more informed consumer of neuroscience claims about internet porn's effects.

Two of the thirty-seven brain studies referred to above are often cited as completely debunking the porn addiction model (Steele, et al., 2013[259] and Prause et al., 2015[260]). However, their actual findings tell a different story. In fact, experts suggest that these two studies' results actually *align with* the addiction model. Both were EEG studies, which measure electrical activity, or brain waves, on the scalp. Although EEG technology has been around for 100 years, debate continues as to what actually causes brain waves, or what specific EEG readings really signify. Still, enigmatic though they are, they tell us something about levels of brain activity.

Kinsey-trained sexologist Nikky Prause has acted as the spokesperson for these two EEG studies. She has repeatedly claimed that the 2013 and 2015 studies both debunk porn and sex addiction. Her bold assertions have been widely publicized in articles that often lack any other perspective on the science. It appears that Prause herself is no longer affiliated with any academic institution.[261]

But what do these studies actually establish? And how far do they justify the claims made for them? Before we answer that, we should bear in mind that each was just one phase of a single experiment. The 2013 study measured brain waves in "individuals experiencing problems regulating their porn viewing". The 2015 study measured the EEG responses of a control group, and then compared the results to data from the 2013 subjects. In other words, the first study did not have a control group when it was published.

With regard to the 2013 paper, two headline-grabbing claims were made in direct opposition to the team's actual findings. First, the spokesperson claimed that their subjects' 'brains did not respond to the images like other addicts to their drug of addiction'. She also claimed that her findings support the view that porn addiction was nothing more than 'high sexual desire'.[262]

Both studies measured EEG readings as participants viewed pictures. Of these, 38 were sexual, involving one woman and one man. The other 187 non-sexual pictures were categorized as pleasant (e.g., skydiving), or neutral (e.g., portrait), or unpleasant (e.g., mutilated body). The EEG readings assessed only attentiveness to the pictures, not sexual excitement or activation of the reward system. The 2013 study (Steele et al.) reported two primary EEG findings.

First, subjects had higher EEG readings for pornographic photos than they did for any other type of picture. No surprise, as it's typical for subjects (addicted or not) to pay more attention to a naked couple having sex than to a picture of someone eating a sandwich. While it's unclear which, if any, of these subjects were porn addicts, studies consistently show that an elevated P300 (EEG measurement) occurs when addicts are exposed to cues associated with

their addiction (cue-reactivity). In short, these subjects' attention to erotic stills was certainly not inconsistent with their being addicted.

Yet in the rush to debunk porn addiction, spokesperson Prause stated in her press release and in interviews that the subjects' 'brains did not look like addicts'. This is not true. The subjects' brains looked a lot like addicts. That is, they showed a bump in attention in response to pictures associated with their compulsive behaviour. There's nothing in the 2013 study to support such a claim, and the research team has yet to divulge the 'brain difference' claimed to exist between its subjects and drug addicts.

The 2013 study's second finding? Problematic porn users with greater brain activation to porn had *lower* desire to have sex with a partner (but not lower desire to masturbate), when compared to problematic users with less brain activation. To put it another way, individuals with more brain activation and cravings for porn preferred masturbating to porn than having sex with a real person. That certainly sounds consistent with the idea that some of these people might really be addicts. Many people who worry about their porn use report that they are masturbating frequently, but that partnered sex is not as arousing as porn use.

Yet the spokesperson publicly stated the opposite of what her team found, claiming the porn users merely had 'high libido'. But to repeat, her subjects' desire for partnered sex *dropped* as their cravings for porn use rose. No fewer than five peer-reviewed papers have pointed out that the study's findings are consistent with the porn addiction model.[263]

Two years later, in 2015, Prause and her team compared an actual control group to the 2013 subjects and generated a second study (Prause et al.).[264] The control subjects showed predictable spikes in EEG readings when they viewed images of vanilla porn, and these spikes were slightly higher than those of the problematic porn users from 2013. In other words, both the controls and problematic porn users registered EEG spikes in response to the porn, but the problematic porn users paid slightly less attention than the controls. This suggests that their brains didn't find the sexual images as interesting as control viewers did.

Last time around, the team spokesperson said that the spike in the EEG readings of the problematic users meant that they weren't addicts. Now, she said that the (comparatively)

lower readings of the problematic porn users somehow 'debunked' porn addiction. In fact, however, lower EEG readings mean that problematic users were paying less attention to the pictures, compared with healthy control subjects. Put simply, her frequent porn users appeared to be desensitized (bored, habituated) to static images of vanilla porn. This finding aligns neatly with other brain studies on internet porn users, all of which experts deem consistent with the addiction model. For example, Kühn & Gallinat[265] also found that more porn use correlated with less brain activation in response to pictures of vanilla porn. And Banca et al.[266] found that porn addicts habituate faster to sexual images. The Banca authors warned that sluggish brain response may drive escalation to more extreme material. This can be an indication of addiction.

The source of some of the confusion is that, superficially, it seems that the 2013 study reported higher EEG spikes for problematic porn users, while the 2015 study reported lower EEG spikes for problematic porn users. The key distinction is: 'EEG spikes compared to whose?' The 2013 study only measured problematic porn users and compared their EEG spikes for porn to non-porn spikes. Spikes for porn were higher than for any other type of picture. In contrast, the 2015 study compared the problematic porn users' 2013 EEG spikes to the newly formed control group's EEG spikes. The problematic porn users' high spikes for porn were a tad lower than the controls' high spikes for porn.

Internet porn studies and their interpretation are complicated by the fact that viewing pornographic images (stills or videos) is the addictive behaviour, rather than solely a cue. By comparison, viewing images of vodka bottles is a cue for an alcoholic (because you can't sip a picture). While that cue may light up an alcoholic's brain more than a control's brain, the alcoholic needs to drink more alcohol to get the same buzz as a non-alcoholic. Similarly, the heavier porn users in the Kühn and Prause studies apparently needed greater stimulation to exhibit their buzz. They didn't respond normally to mere stills. Experts consider this evidence of tolerance (and underlying addiction-related brain changes).

So far, six peer-reviewed papers have disagreed with the spokesperson's interpretation of her team's second paper.[267] All suggest that her team's 2015 study found desensitization/habituation (consistent with addiction-model predictions) in frequent porn users. Prause, however, continues to claim that her teams have falsified the addiction model.

Some of the peer-reviewed critiques also point out serious methodological flaws in the two studies. First, the 2013 EEG study had no control group of 'non-addicts' for comparison, yet a control group was indispensable in order to make the kinds of claims made. Secondly, many of the experiment's problematic porn users weren't actually porn addicts. In studies comparing brain activation patterns of addicts vs. non-addicts, you must establish who is and is not using porn compulsively. Unlike other brain studies on porn addiction, these researchers did not pre-screen subjects with an internet porn use assessment tool. Instead, subjects were recruited from Pocatello, Idaho via online advertisements seeking subjects who were 'experiencing problems regulating their viewing of sexual images.'

In a 2013 interview, the team spokesperson admitted that a number of the subjects experienced only minor problems (i.e., they were not addicts). How can one 'falsify the addiction model' without recruiting and investigating subjects who would be considered addicted?[268]

Thirdly the researchers did not screen subjects for mental disorders, compulsive behaviours, or other addictions. This is critically important for any brain study on addiction, so that researchers can be somewhat confident that they are measuring the effects, if any, of addiction and not the effects of some other disorder.

Fourthly, and perhaps most seriously, the study subjects were not heterogeneous. They were men and women, including seven non-heterosexuals, but were all shown standard, possibly uninteresting, male+female porn. This alone discounts any findings. Why? Study after study confirms that men and women have significantly *different* brain responses to sexual images or films. This is why serious addiction researchers carefully match subjects.

These flaws, which make the results uninterpretable, may explain why some neuroscientists omitted these papers from recent reviews of the literature.[269]

It is easy to find articles online that rely on Prause's claims that 'porn addiction has been debunked' or 'falsified' by these two EEG studies. But her claims are incorrect. The information generated by the studies does not support the conclusions that she draws from it.

Worse, the problems with the methodology mean that the information doesn't reliably support any conclusions at all.

Another of Prause's widely publicized talking points is that addiction doesn't exist; only 'a cultural trend to label sexual shame around sexual behaviours as "addictive disorders" exists.'[270] She has also characterized online recovery forums as 'shaming forums'.

The shame claim is common among a few of the most vocal bloggers and researchers, a number of whom appear to be ex-religious or reacting to conservative upbringings. It's a puzzling claim, however, as the majority of members of the most popular online porn recovery forums appear to be agnostic or atheist,[271] and would still happily be using porn if they weren't concerned about severe symptoms. Any shame they feel is due to their temporary inability to control use, not sexual shame. Nor is there much evidence that the people who post on the forums are interested in shaming one another. Visitors to sites like reddit/nofap often marvel at how mutually supportive and good natured its members are.

Moreover, there's no evidence that shame of any type induces the well established addiction-related brain changes reputable neuroscientists are turning up in porn users' brains. Indeed, there's every reason to suppose they are the very changes behind self-reports of addiction and unwanted sexual conditioning.

Vocal sexologists are not the only ones insisting that porn use is harmless, or even beneficial, often relying exclusively on their own papers. It is also not uncommon for sex counsellors to dismiss studies, correlational, longitudinal and otherwise, that contradict their views.

Others call for 'double-blind studies' before they will take the alleged harms seriously. While that sounds rigorously scientific – who, after all, could be against something as scientifically respectable as the 'double-blind'? – it is in fact profoundly silly. 'Double-blind' means that neither the investigator nor the subject knows that a variable has been altered. For example, neither knows who is receiving drug or placebo. 'Single-blind' means the investigator knows but the subject doesn't. It should be evident that neither type of study is possible in the case of porn use. The subject will always know that he or she has stopped using porn. If you hear

anyone calling for 'double-blind studies' in this context you can be sure of one thing: they don't know what they're talking about.

As I say, the most enlightening causation experiment currently possible is being done right now by thousands of people in various online forums. Porn users are removing a single variable that they all have in common: porn use. This 'study' is not perfect. Other variables are also at work in their lives. But that would be equally true in a formal study testing the effects of, say, anti-depressants. Subjects will always have different diets, relationship situations, childhoods and so forth. It is past time for objective academic researchers to follow the lead of the pioneers online and design research that reveals causal direction that is not open to politicised interpretation.[272]

Some experts believe that porn-addiction deniers are not unlike the shills of the tobacco industry.[273] The difference is that their motives often appear to stem from uncritical 'sex positivity'.

Education – But What Kind and By Whom?

What happened when researchers asked questions based on teens' reality instead of researchers' theories? The data promptly lined up with the anecdotes in this book.

An anal sex study of men and women ages 16 to 18[274] analysed a large qualitative sample from three diverse sites in England. Said the researchers: 'Few young men or women reported finding anal sex pleasurable and both expected anal sex to be painful for women.'

Why were couples engaging in anal sex if neither party found it pleasurable? 'The main reasons given for young people having anal sex were that men wanted to copy what they saw in pornography, and that "it's tighter". And "People must like it if they do it" (made alongside the seemingly contradictory expectation that it will be painful for women).'

This looks like a perfect example of adolescent brain training; 'This is how it's done; this is what I should do.' Also at work is a desire to boast to one's peers about being able to duplicate the acts seen in porn.

However, porn consumers may also be seeking more 'edgy' sexual practices and more intense stimulation ('tighter') due to the blunted sensitivity to pleasure (desensitization) researchers are reporting in today's porn users. If so, teens need more than 'discussions of pleasure, pain, consent and coercion' (recommended by the anal-sex researchers). Youthful consumers also need to learn how chronic overstimulation can alter their brains and drive a progressive search for more intense stimulation.

Already, teens are figuring out that porn is having unwanted effects on their lives. A 2014 poll of 18-year olds from across the UK[275] found the following:

– Pornography can be addictive: Agree: 67% Disagree: 8%
– Pornography can have a damaging impact on young people's views of sex or relationships: Agree: 70% Disagree: 9%
– Pornography has led to pressure on girls or young women to act a certain way: Agree: 66% Disagree: 10%
– Pornography leads to unrealistic attitudes toward sex: Agree: 72% Disagree: 7%
– There's nothing wrong with watching pornography: Agree: 47% Disagree: 19%

Is it possible that teens who have grown up with streaming porn and watched the effects on their peers know more about its impact than the sexologists endeavouring to educate them? Only 19% of teens saw something wrong with watching pornography, but more than two thirds perceived porn's harmful effects.

These results suggest that many young people don't fit into the sexology narrative about porn. They don't think it's wrong to watch pornography. That is, they (presumably) don't reject it on puritanical grounds or out of 'sex negative' shame. Yet many of those who have no objection to porn as such believe that it can cause serious problems. Given the evidence, we need to listen to today's users and their peers because the phenomenon is moving so fast. It seems futile to try to keep adolescents away from explicit material altogether and recklessly irresponsible not to inform them properly about its potential for harm.

So what do we do to prepare (potential) porn users so, like smokers, they can make informed choices? Perhaps you've heard that education is the solution. I agree, but such education needs to be done by experts trained in relevant brain science. Consumers need to be aware of the symptoms that today's internet porn users are reporting, as well as how the brain learns, how chronic overconsumption can alter it for the worse (sexual conditioning, addiction), and what is entailed in reversing unwanted brain changes.

Furthermore, all ages can benefit from knowledge of how the primitive appetite mechanism of the brain, the reward circuitry, has priorities set by evolution: furthering survival and genetic success. It votes 'Yes!' for more calories or more 'fertilization' opportunities regardless of the potential consequences.

People also need to know that reward-circuitry balance is indispensable for lifelong emotional, physical and mental wellbeing because of its power to shape our perceptions and priorities without our conscious awareness. And to be informed of methods that help humans steer for balance in the reward circuitry: exercise and other beneficial stressors, time in nature, companionship, healthy relationships, meditation and so on.

Once we begin to think clearly about neuroplasticity we are inevitably drawn to the question of what we want from life – what we consider to be a good life. Each of us must answer that for ourselves. But we are best able to do so when we understand the threats that some substances and behaviours pose to our capacity to choose the lives we want. Self-determination requires that we understand ourselves as best we can.

When we are dealing with young people we have an even greater responsibility to understand the risks that explicit sexual material can pose. Adolescents cannot safely decide for themselves what constitutes the good life and there are grounds for thinking that disruption of their reward-circuits can take more of a toll than in adults. So, I would also like to see widespread education about the unique vulnerabilities of the adolescent brain with respect to sexual conditioning and addiction. Adolescent brains are more plastic than adult brains, and evolutionarily speaking, their most important job is to adapt to their sexual environment so they can reproduce successfully.

Take kids into the countryside and have them measure the physiological effects it has on them. Help them to appreciate the possibilities for connection and fulfilment that don't need wifi access. Encourage them to take a break from screens. We know far more about how the brain works than we did even a few years ago. We owe it to young people to share that knowledge, and to help them flourish in a culture where there are fortunes to made from loneliness and addiction.

Instead, you sometimes hear that schools only need to teach kids about consent, bullying those who are different, the risks of sexual shame, and how to distinguish 'good porn' from 'bad porn'. For example, in 2013 the *Daily Mail* proclaimed, 'teachers should give lessons in pornography and tell pupils "it's not all bad", experts say'. The claim is that all one needs to know to enjoy porn is the difference between fantasy and reality.

Sadly, there is not one shred of scientific evidence to support the idea that pointing kids to 'good porn' will prevent problems or prepare them for today's hyperstimulating environment. Such thinking actually runs counter to hundreds of internet-addiction brain science studies as well as research on internet porn users.[276] All suggest that the internet itself – that is, the delivery on demand of endless enticing stimulation – is the chief peril. Even if porn users confine their excursions to 'good porn', they still risk loss of attraction to real partners if they inadvertently condition their sexual response to screens, voyeurism, isolation and the ability to click to more stimulation at will.

> *I just use stills of athletic women. But I'm looking for that right girl or image that gets me off, so I view hundreds per session. My current girlfriend actually fits what I would masturbate to. While I'm very attracted to her I'm noticing weak erections. I believe my brain rewired to the 'searching' aspect as well as the variety and the comfort of not having to please anyone but myself.*

Watching 'good porn' won't eradicate the risks, nor will leaving viewers in ignorance of the science behind potential harms for fear of shaming them. For users whose brains readily adapt in response to overstimulation (and go out of balance as a consequence), and in a world where sexually arousing imagery can be accessed instantly and endlessly, is there any such thing as 'good' digital porn? A single explicit image isn't going to cause problems, any more

than a spoonful of sugar will bring on diabetes. But on the internet there is sugar everywhere. For religious, ex-religious or nonreligious users, the unending erotic novelty of the internet is a risky supernormal stimulus.

It should also be evident that teaching 'realistic sex' doesn't stop teens from accessing extreme content when left (literally) to their own devices. Teen brains evolved with a penchant for the weird and wonderful; they are powerfully drawn to novelty and surprise. Such a naive policy would be like handing a teen an old issue of *Playboy* and telling him that the only suitable content is on pages five through eight. As a teen, which pages would you have turned to first?

While we're on the subject, the good-porn-bad-porn and sexual shaming hypotheses may arise from less than noble intent. They lay the groundwork for endless debate about *values*. They invite the most vocal and their dedicated journalists to lobby for the suitability of their preferred types of porn while maintaining that critics are trying to impose their arbitrary 'shaming' standards. Yet frankly, as the research shows,[277] porn content and orientation of the viewer may be of little import compared with delivery method. Since the advent of streaming clips of porn videos, escalating, morphing sexual tastes, a range of sexual dysfunctions and loss of attraction to real partners appear to be affecting a percentage of all groups: gay, straight and in between. It is the way that users can over stimulate themselves that seems to create problems.

Speaking of that hazard, no one yet knows what virtual reality porn will bring, but reports from both the lab[278] and real life[279] are ominous:

> *The reaction of everybody I've shown it to is the same: 'Holy crap. That's shit's intense. This will change everything.'*
>
> *

> *I was a relative early adopter of VR … and during 2015 things started to really take off but so did my addiction as a result. I found myself for the first time in my entire life actually paying for porn because I didn't want to wait for torrents to become available!*

*

I'm 42 and have pretty much been a daily PMO'er since I was about 12. I've never had trouble with PIED. I've only been exposed to VR porn for a few months - maybe twice per month. But, just that limited exposure has triggered some problems with PIED. It's just not worth it.

*

We've really gotta do something to combat this shit. Kids growing up in a world of VR porn are going to be going through hell. To the porn industry they'll be fish in a barrel. It's up to us, the ones with the knowledge, experience and the means, to help the future generation. We could be the generation that ends porn, if we put our energy together. But if we at least made our message as clear as a set of pixel-tits, we could give the next generation of men a fighting chance!

For now, let's steer the debate away from unscientific distractions and back to the effects on porn users and the hard science that helps explain what they're experiencing. In the process, we can all learn a lot about human sexuality.

In the end, such a focus will also serve porn users. Like smokers, they will be able to make informed choices about pornography use with full knowledge of its risks for plastic brains like ours.

We are what we repeatedly do. Aristotle

FURTHER READING

Burnham, Terry and Phelan, Jay, *Mean Genes: From Sex to Money to Food Taming Our Primal Instincts*, New York: Basic Books, 2000. Funny, informative book about how the reward circuitry of the brain drives us to do things that are not always in our best interests.

Chamberlain, Mark, PhD and Geoff Steurer MS, LMFT, *Love You, Hate the Porn: Healing a Relationship Damaged by Virtual Infidelity*, Salt Lake City: Shadow Mountain, 2011. Practical guide for married couples where one partner was deeply upset by the other partner's porn use.

Church, Noah B.E., *Wack: Addicted to Internet Porn*, Portland: Bvrning Qvestions, LLC, 2014. Brilliant, readable, personal account of a 24-year old who recovered from porn-related sexual dysfunction.

Doidge, Norman, MD, *The Brain That Changes Itself*, New York: Viking, 2007. Fascinating book about brain plasticity, with a chapter on sex and porn.

Fisch, Harry, MD, *The New Naked: The Ultimate Sex Education for Grown-Ups*, Naperville: Sourcebooks, Inc. 2014. Standard-issue self-help book for couples with porn-related problems.

Fradd, Matt, *The Porn Myth: Exposing the Reality Behind the Fantasy of Pornography*, Ignatius Press, 2017. Fradd takes on common arguments by porn addiction naysayers.

Hall, Paula, *Understanding and Treating Sex Addiction: A Comprehensive Guide For People Who Struggle With Sex Addiction And Those Who Want To Help Them*, East Sussex: Routledge, 2013. Practical guide for therapists and porn-afflicted alike by UK therapist.

McDougal, Brian, *Porned Out: Erectile Dysfunction, Depression, And 7 More (Selfish) Reasons To Quit Porn*, Kindle ebook, 2012. Brief, useful book by recovered porn user.

Maltz, Wendy, LCSW, DST and Larry Maltz, *The Porn Trap: The Essential Guide to Overcoming Problems Caused by Pornography*, New York: Harper, 2010. Practical guide for therapists and porn-afflicted alike by US therapists.

Robinson, Marnia, *Cupid's Poisoned Arrow: From Habit to Harmony in Sexual Relationships*, Berkeley: North Atlantic Books, 2011. Discusses the effects of sex on the brain and relationships, with a chapter on porn.

Toates, Frederick, *How Sexual Desire Works: The Enigmatic Urge*, Cambridge: Cambridge University Press, 2014. Toates, Emeritus Professor of Biological Psychology at the Open University, outlines the relevance of neuroplasticity for nearly every aspect of human sexuality, addiction included.

[1] Compulsive sexual behaviour disorder. Available at: https://icd.who.int/browse11/l-m/en#/http://id.who.int/icd/entity/1630268048
[2] Gola, M. & Potenza, M. Promoting, educational, classification, treatment, and policy initiatives. J. Behav. Addict. 7, doi.org/10.1556/2006.7.2018.51 (2018).
[3] Lim, M. S. C., Agius, P. A., Carrotte, E. R., Vella, A. M. & Hellard, M. E. Young Australians' use of pornography and associations with sexual risk behaviours. Aust. N. Z. J. Public Health (2017). doi:10.1111/1753-6405.12678
[4] Chinese way of nofap (https://www.reddit.com/r/NoFap/comments/28smcs/ chinese_way_of_nofap/).
[5] Sabina, C., Wolak, J., & Finkelhor, D. The nature and dynamics of Internet pornography exposure for youth. CyberPsychology & Behaviour, 11, 691-693 (2008).
[6] Sun, C., Bridges, A., Johnson, J. A. & Ezzell, M. B. Pornography and the Male Sexual Script: An Analysis of Consumption and Sexual Relations. Arch. Sex. Behav. 45, 983–994 (2016).
[7] See endnote 3.
[8] See endnote 3.
[9] Janssen, E. & Bancroft, J. The Psychophysiology of Sex., Chapter: The Dual-Control Model: The role of sexual inhibition & excitation in sexual arousal and behavior. in The Psychophysiology of Sex 197–222 (Indiana University Press, 2007).
[10] LIVE BLOG: Porn-induced erectile dysfunction and young men | Globalnews.ca. Available at: http://globalnews.ca/news/1232800/live-blog-porn-induced-erectile-dysfunction-and-young-men/.
[11] Fisch MD, H. The New Naked: The Ultimate Sex Education for Grown-Ups. (Sourcebooks, Inc., 2014).
[12] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014).
[13] Voon, V. et al. Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. PloS One 9, e102419 (2014).
[14] Mouras, H. et al. Activation of mirror-neuron system by erotic video clips predicts degree of induced erection: an fMRI study. NeuroImage 42, 1142–1150 (2008).
[15] Julien, E. & Over, R. Male sexual arousal across five modes of erotic stimulation. Arch. Sex. Behav. 17, 131–143 (1988).
[16] Brand, M. et al. Watching pornographic pictures on the Internet: role of sexual arousal ratings and psychological-psychiatric symptoms for using Internet sex sites excessively. Cyberpsychology Behav. Soc. Netw. 14, 371–377 (2011).
[17] Pagoto PhD, S. What Do Porn and Snickers Have in Common? Psychology Today Available at: http://www.psychologytoday.com/blog/shrink/201208/what-do-porn-and-snickers-have-in-common.
[18] Links to Chinese forums: http://www.jiese.org/bbs/index.php, http://bbs.jiexieyin. org/forum.php and http://tieba.baidu.com. Also see this forum post, 'Chinese way of nofap' June 22, 2014, http://www.reddit.com/r/NoFap/comments/28smcs/ chinese_way_of_nofap.
[19] Rodríguez-Manzo, G., Guadarrama-Bazante, I. L. & Morales-Calderón, A. Recovery from sexual exhaustion-induced copulatory inhibition and drug hypersensitivity follow a same time course: two expressions of a same process? Behav. Brain Res. 217, 253–260 (2011).
[20] Medina PhD, J. J. Of Stress and Alcoholism, Of Mice and Men | Psychiatric Times. Psychiatric Times (2008). Available at: http://www.psychiatrictimes.com/ articles/stress-and-alcoholism-mice-and-men.
[21]http://www.reddit.com/r/NoFap; http://www.rebootnation.org; http://www. reddit.com/r/pornfree; http://www.yourbrainrebalanced.com; http://www.nofap.com.

[22] NoFap Survey, www.reddit.com/r/NoFap, March, 2014, https://docs.google.com/file/d/0B7q3tr4EV02wbkpTTVk4R2VGbm8/edit?pli=1.
[23] Wilson, G. Eliminate Chronic Internet Pornography Use to Reveal Its Effects. ADDICTA Turk J Addict 3, 1–13 (2016).
[24] Negash, S., Sheppard, N. V. N., Lambert, N. M. & Fincham, F. D. Trading Later Rewards for Current Pleasure: Pornography Consumption and Delay Discounting. J. Sex Res. 53, 689–700 (2016).
[25] Lambert, N. M., Negash, S., Stillman, T. F., Olmstead, S. B. & Fincham, F. D. A Love That Doesn't Last: Pornography Consumption and Weakened Commitment to One's Romantic Partner. J. Soc. Clin. Psychol. 31, 410–438 (2012).
[26] Bronner, G. & Ben-Zion, I. Z. Unusual masturbatory practice as an etiological factor in the diagnosis and treatment of sexual dysfunction in young men. J. Sex. Med. 11, 1798–1806 (2014).
[27] Park, B. Y. et al. Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. Behav. Sci. 6, (2016).
[28] Porto, R. Habitudes masturbatoires et dysfonctions sexuelles masculines. Sexologies (2016). doi:10.1016/j.sexol.2016.03.004
[29] Blair, L. How difficult is it to treat delayed ejaculation within a short-term psychosexual model? A case study comparison. Sex. Relatsh. Ther. 0, 1–11 (2017).
[30] Sproten, A. How Abstinence Affects Preferences, http://www.alec-sproten.eu/language/en/2016/01/18/how-abstinence-affects-preferences/. (2016).
[31] Harper, C. & Hodgins, D. C. Examining Correlates of Problematic Internet Pornography Use Among University Students. J. Behav. Addict. 5, 179–191 (2016).
[32] Giordano, A. L. & Cashwell, C. S. Cybersex Addiction Among College Students: A Prevalence Study. Sex. Addict. Compulsivity 24, 47–57 (2017).
[33] Wéry, A. & Billieux, J. Online sexual activities: An exploratory study of problematic and non-problematic usage patterns in a sample of men. Comput. Hum. Behav. 56, 257–266 (2016).
[34] Kraus, S. W., Martino, S. & Potenza, M. N. Clinical Characteristics of Men Interested in Seeking Treatment for Use of Pornography. J. Behav. Addict. 5, 169–178 (2016).
[35] Aboul-Enein, B. H., Bernstein, J. & Ross, M. W. Evidence for Masturbation and Prostate Cancer Risk: Do We Have a Verdict? Sex. Med. Rev. 4, 229–234 (2016).
[36] Daine, K. et al. The Power of the Web: A Systematic Review of Studies of the Influence of the Internet on Self-Harm and Suicide in Young People. PLOS ONE 8, e77555 (2013).

[37] Janssen, E. & Bancroft, J. The Psychophysiology of Sex., Chapter: The Dual-Control Model: The role of sexual inhibition & excitation in sexual arousal and behavior. in The Psychophysiology of Sex 197–222 (Indiana University Press, 2007); Voon, V. et al. Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. PloS One 9, e102419 (2014); Blair, L. How difficult is it to treat delayed ejaculation within a short-term psychosexual model? A case study comparison. Sex. Relatsh. Ther. 0, 1–11 (2017); Pizzol, D., Bertoldo, A. & Foresta, C. Adolescents and web porn: a new era of sexuality. Int. J. Adolesc. Med. Health 28, 169–173 (2015); Daneback, K., Traeen, B. & Månsson, S.-A. Use of pornography in a random sample of Norwegian heterosexual couples. Arch. Sex. Behav. 38, 746–753 (2009); Carvalheira, A., Træen, B. & Štulhofer, A. Masturbation and Pornography Use Among Coupled Heterosexual Men With Decreased Sexual Desire: How Many Roles of Masturbation? J. Sex Marital Ther. 41, 626–635 (2015); Wright, P. J., Sun, C., Steffen, N. J. & Tokunaga, R. S. Associative pathways between pornography consumption and reduced sexual satisfaction. Sex. Relatsh. Ther. 0, 1–18 (2017).

[38] de Boer, B. J. et al. Erectile dysfunction in primary care: prevalence and patient characteristics. The ENIGMA study. Int. J. Impot. Res. 16, 358–364 (2004).
[39] Prins, J., Blanker, M., Bohnen, A., Thomas, S. & Bosch, J. Prevalence of erectile dysfunction: a systematic review of population-based studies. Publ. Online 13 Dec. 2002 101038sjijir3900905doi 14, (2002).
[40] Park, B. Y. et al. Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. Behav. Sci. 6, (2016).
[41] Nicolosi, A. et al. Sexual behavior and sexual dysfunctions after age 40: the global study of sexual attitudes and behaviors. Urology 64, 991–997 (2004).
[42] Landripet, I. & Štulhofer, A. Is Pornography Use Associated with Sexual Difficulties and Dysfunctions among Younger Heterosexual Men? J. Sex. Med. 12, 1136–1139 (2015).
[43] O'Sullivan, L. F., Byers, E. S., Brotto, L. A., Majerovich, J. A. & Fletcher, J. A Longitudinal Study of Problems in Sexual Functioning and Related Sexual Distress Among Middle to Late Adolescents. J. Adolesc. Health Off. Publ. Soc. Adolesc. Med. (2016). doi:10.1016/j.jadohealth.2016.05.001
[44] Marston, C. & Lewis, R. Anal heterosex among young people and implications for health promotion: a qualitative study in the UK. BMJ Open 4, e004996 (2014).
[45] Flegal, K. M., Carroll, M. D., Ogden, C. L. & Curtin, L. R. Prevalence and trends in obesity among US adults, 1999-2008. JAMA 303, 235–241 (2010).
[46] Results from the 2013 NSDUH: Summary of National Findings, SAMHSA, CBHSQ. Available at: https://www.samhsa.gov/data/sites/default/files/ NSDUHresultsPDFWHTML2013/Web/NSDUHresults2013.htm#fig2.2.
[47] Health, C. O. on S. and. Smoking and Tobacco Use; Data and Statistics; Tables, Charts, and Graphs; Trends in Current Cigarette Smoking. Smoking and Tobacco Use Available at: http://www.cdc.gov/tobacco/data_statistics/tables/ trends/cig_smoking/.
[48] Bancroft, J. et al. The relation between mood and sexuality in heterosexual men. Arch. Sex. Behav. 32, 217–230 (2003).
[49] Mathew, R. J. & Weinman, M. L. Sexual dysfunctions in depression. Arch. Sex. Behav. 11, 323–328 (1982).
[50] Your Brain On Porn. Studies linking porn use or porn/sex addiction to sexual dysfunctions, lower arousal, and lower sexual & relationship satisfaction. Your Brain On Porn Available at: https://yourbrainonporn.com/studies-reported-relationships-between-porn-use-or-porn-addictionsex-addiction-and-sexual.

[51] Harper, C. & Hodgins, D. C. Examining Correlates of Problematic Internet Pornography Use Among University Students. J. Behav. Addict. 5, 179–191 (2016).
[52] Zillmann, D. & Bryant, J. Pornography's Impact on Sexual Satisfaction. J. Appl. Soc. Psychol. 18, 438–453 (1988).
[53] Zillmann, D. Effects of Prolonged Consumption of Pornography. Pap. Prep. Surg. Gen. Workshop Pornogr. Public Health https://profiles.nlm.nih.gov/ps/ access/nnbckv.pdf, (1986).

[54] Wéry, A. & Billieux, J. Online sexual activities: An exploratory study of problematic and non-problematic usage patterns in a sample of men. Comput. Hum. Behav. 56, 257–266 (2016).
[55] Wolchik, S. A. et al. The effect of emotional arousal on subsequent sexual arousal in men. J. Abnorm. Psychol. 89, 595–598 (1980).
[56] Spencer, B. Why a hungry man loves a curvy woman: They have evolved to prefer people who seem to have better access to food. Available at: http://www. dailymail.co.uk/news/article-2650221/Why-hungry-man-loves-curvy-woman-They-evolved-prefer-people-better-access-food.html.
[57] Brom, M., Both, S., Laan, E., Everaerd, W. & Spinhoven, P. The role of conditioning, learning and dopamine in sexual behavior: A narrative review of animal and human studies. Neurosci. Biobehav. Rev. 38, 38–59 (2014).
[58] Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016); Gola, M. et al. Can Pornography be Addictive? An fMRI Study of Men Seeking Treatment for Problematic Pornography Use. Neuropsychopharmacol. Off. Publ. Am. Coll. Neuropsychopharmacol. (2017). doi:10.1038/npp.2017.78; Stark, R. & Klucken, T. Neuroscientific Approaches to (Online) Pornography Addiction. in Internet Addiction 109–124 (Springer, Cham, 2017). doi:10.1007/978-3-319-46276-9_7
[59] Müller, K. et al. Changes in sexual arousal as measured by penile plethysmography in men with pedophilic sexual interest. J. Sex. Med. 11, 1221–1229 (2014).

[60] Downing, M. J., Schrimshaw, E. W., Scheinmann, R., Antebi-Gruszka, N. & Hirshfield, S. Sexually Explicit Media Use by Sexual Identity: A Comparative Analysis of Gay, Bisexual, and Heterosexual Men in the United States. Arch. Sex. Behav. (2016). doi:10.1007/s10508-016-0837-9
[61] Tomikawa, Y. No Sex, Please, We're Young Japanese Men - Japan Real Time - WSJ. The Wall STreet Journal (2011). Available at: https://blogs.wsj.com/ japanrealtime/2011/01/13/no-sex-please-were-young-japanese-men/.
[62] Samuel, H. French women 'are the sexual predators now'. The Telegraph (2008). Available at: http://www.telegraph.co.uk/news/worldnews/1581043/ French-women-are-the-sexual-predators-now.html.
[63] Pizzol, D., Bertoldo, A. & Foresta, C. Adolescents and web porn: a new era of sexuality. Int. J. Adolesc. Med. Health 28, 169–173 (2015).
[64] Researchers reveal that today's teens are having LESS sex than previous generations - and why - Mirror Online. Available at: http://www.mirror.co.uk/ science/researchers-reveal-todays-teens-having-8547144.
[65] Sun, C., Bridges, A., Johnson, J. A. & Ezzell, M. B. Pornography and the Male Sexual Script: An Analysis of Consumption and Sexual Relations. Arch. Sex. Behav. 45, 983–994 (2016).
[66] Wright, P. J., Sun, C., Steffen, N. J. & Tokunaga, R. S. Associative pathways between pornography consumption and reduced sexual satisfaction. Sex. Relatsh. Ther. 0, 1–18 (2017).

[67] Liu, Y. et al. Nucleus accumbens dopamine mediates amphetamine-induced impairment of social bonding in a monogamous rodent species. Proc. Natl. Acad. Sci. 107, 1217–1222 (2010).
[68] Viegas, J. Flirty strangers sway how men see partners. Discovery News/ABC Science (2007). Available at: http://www.abc.net.au/science/articles/2007/03/26/1881621.htm.
[69] Zillmann, D. & Bryant, J. Pornography's Impact on Sexual Satisfaction. J. Appl. Soc. Psychol. 18, 438–453 (1988).
[70] Your Brain On Porn. Studies linking porn use or porn/sex addiction to sexual dysfunctions, lower arousal, and lower sexual & relationship satisfaction. Your Brain On Porn Available at: https://yourbrainonporn.com/studies-reported-relationships-between-porn-use-or-porn-addictionsex-addiction-and-sexual.

[71] Studies linking porn use to poorer mental-emotional health & poorer cognitive outcomes | Your Brain On Porn. Available at: https://www.yourbrainonporn.com/ studies-linking-porn-use-poorer-mental-cognitive-health.
[72] Mitra, M. & Rath, P. Effect of internet on the psychosomatic health of adolescent school children in Rourkela - A cross-sectional study. Indian J. Child Health 4, 289–293 (2017).
[73] Brand, M. et al. Watching pornographic pictures on the Internet: role of sexual arousal ratings and psychological-psychiatric symptoms for using Internet sex sites excessively. Cyberpsychology Behav. Soc. Netw. 14, 371–377 (2011).
[74] Schiebener, J., Laier, C. & Brand, M. Getting stuck with pornography? Overuse or neglect of cybersex cues in a multitasking situation is related to symptoms of cybersex addiction. J. Behav. Addict. 4, 14–21 (2015); Messina, B., Fuentes, D., Tavares, H., Abdo, C. H. N. & Scanavino, M. de T. Executive Functioning of Sexually Compulsive and Non-Sexually Compulsive Men Before and After Watching an Erotic Video. J. Sex. Med. 14, 347–354 (2017); Leppink, E. W., Chamberlain, S. R., Redden, S. A. & Grant, J. E. Problematic sexual behavior in young adults: Associations across clinical, behavioral, and neurocognitive variables. Psychiatry Res. 246, 230–235 (2016).
[75] Beyens, I., Vandenbosch, L. & Eggermont, S. Early Adolescent Boys' Exposure to Internet Pornography: Relationships to Pubertal Timing, Sensation Seeking, and Academic Performance. J. Early Adolesc. 35, 1045–1068 (2015).
[76] Cheng, W. & Chiou, W.-B. Exposure to Sexual Stimuli Induces Greater Discounting Leading to Increased Involvement in Cyber Delinquency Among Men. Cyberpsychology Behav. Soc. Netw. (2017). doi:10.1089/cyber.2016.0582; Negash, S., Sheppard, N. V. N., Lambert, N. M. & Fincham, F. D. Trading Later Rewards for Current Pleasure: Pornography Consumption and Delay Discounting. J. Sex Res. 53, 689–700 (2016); Sproten, A. How Abstinence Affects Preferences, http://www.alec-sproten.eu/ language/en/2016/01/18/how-abstinence-affects-preferences/. (2016).

[77] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014).
[78] Myers, B. A. Researchers both induce, relieve depression symptoms in mice by stimulating single brain region with light. News Center Available at: http://med. stanford.edu/news/all-news/2012/12/researchers-both-induce-relieve-depression-symptoms-in-mice-by-stimulating-single-brain-region-with-light.html.

[79] See for example Voon, V. et al. Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. PloS One 9, e102419 (2014); Brand, M. et al. Watching pornographic pictures on the Internet: role of sexual arousal ratings and psychological-psychiatric symptoms for using Internet sex sites excessively. Cyberpsychology Behav. Soc. Netw. 14, 371–377 (2011); Weaver, J. B. et al. Mental- and physical-health indicators and sexually explicit media use behavior by adults. J. Sex. Med. 8, 764–772 (2011).
[80] Levin, M. E., Lillis, J. & Hayes, S. C. When is Online Pornography Viewing Problematic Among College Males? Examining the Moderating Role of Experiential Avoidance. Sex. Addict. Compulsivity 19, 168–180 (2012).
[81] Mattebo, M. Use of Pornography and its Associations with Sexual Experiences, Lifestyles and Health among Adolescents. (2014).
[82] Kasper, T. E., Short, M. B. & Milam, A. C. Narcissism and Internet pornography use. J. Sex Marital Ther. 41, 481–486 (2015).
[83] Pfaus, J. G. Dopamine: helping males copulate for at least 200 million years: theoretical comment on Kleitz-Nelson et al. (2010). Behav. Neurosci. 124, 877-880; discussion 881-883 (2010).
[84] Giuliano, F. & Allard, J. Dopamine and male sexual function. Eur. Urol. 40, 601–608 (2001).
[85] Wise, R. A. Dual roles of dopamine in food and drug seeking: the drive-reward paradox. Biol. Psychiatry 73, 819–826 (2013); Pfaus, J. G. & Scepkowski, L. A. The biologic basis for libido. Curr. Sex. Health Rep. 2, 95–100 (2005); Young, K. A., Gobrogge, K. L., Liu, Y. & Wang, Z. The neurobiology of pair bonding: insights from a socially monogamous rodent. Front. Neuroendocrinol. 32, 53–69 (2011); Cell Press. Pure Novelty Spurs The Brain. ScienceDaily Available at: https:// www.sciencedaily.com/releases/2006/08/060826180547.htm.
[86] Angier, N. A Molecule of Motivation, Dopamine Excels at Its Task - The New York Times. The New York Times (2009).
[87] Learning addiction: Dopamine reinforces drug-associated memories. EurekAlert!
[88] Salamone, J. D. & Correa, M. The mysterious motivational functions of mesolimbic dopamine. Neuron 76, 470–485 (2012).
[89] Sapolsky, R. Dopamine Jackpot! Sapolsky on the Science of Pleasure - Video Dailymotion. FORA TV (2012). Available at: http://www.dailymotion.com/ video/xh6ceu.
[90] Kuehn, B. M. Willingness to Work Hard Linked to Dopamine Response in Brain Regions. news@JAMA (2012).
[91] Berridge, K. C., Robinson, T. E. & Aldridge, J. W. Dissecting components of reward: 'liking', 'wanting', and learning. Curr. Opin. Pharmacol. 9, 65–73 (2009).
[92] Weinschenk, S. 100 Things You Should Know About People: #8 — Dopamine Makes You Addicted To Seeking Information – The Team W Blog. The Team W Blog (2009).
[93] Robinson, T. E. & Berridge, K. C. The incentive sensitization theory of addiction: some current issues. Philos. Trans. R. Soc. B Biol. Sci. 363, 3137–3146 (2008).
[94] Cell Press. Pure Novelty Spurs The Brain. ScienceDaily Available at: https:// www.sciencedaily.com/releases/2006/08/060826180547.htm.
[95] Koukounas, E. & Over, R. Changes in the magnitude of the eyeblink startle response during habituation of sexual arousal. Behav. Res. Ther. 38, 573–584 (2000).
[96] Meuwissen, I. & Over, R. Habituation and dishabituation of female sexual arousal. Behav. Res. Ther. 28, 217–226 (1990).

[97] Joseph, P. N., Sharma, R. K., Agarwal, A. & Sirot, L. K. Men Ejaculate Larger Volumes of Semen, More Motile Sperm, and More Quickly when Exposed to Images of Novel Women. Evol. Psychol. Sci. 1, 195–200 (2015).
[98] Kepecs, A. Big Think Interview With Adam Kepecs - Video. (2010).
[99] Spicer, J. et al. Sensitivity of the nucleus accumbens to violations in expectation of reward. NeuroImage 34, 455–461 (2007).
[100] Barlow, D. H., Sakheim, D. K. & Beck, J. G. Anxiety increases sexual arousal. J. Abnorm. Psychol. 92, 49–54 (1983).
[101] Arias-Carrión, O. & Pŏppel, E. Dopamine, learning, and reward-seeking behavior. Acta Neurobiol. Exp. (Warsz.) 67, 481–488 (2007).
[102] Aston-Jones, G. & Kalivas, Brain Norepinephrine Rediscovered in Addiction Research. Biol. Psychiatry 63, 1005–1006 (2008).
[103] Beggs, V. E., Calhoun, K. S. & Wolchik, S. A. Sexual anxiety and female sexual arousal: a comparison of arousal during sexual anxiety stimuli and sexual pleasure stimuli. Arch. Sex. Behav. 16, 311–319 (1987).
[104] Wolchik, S. A. et al. The effect of emotional arousal on subsequent sexual arousal in men. J. Abnorm. Psychol. 89, 595–598 (1980).
[105] Hilton, D. L. Pornography addiction – a supranormal stimulus considered in the context of neuroplasticity. Socioaffective Neurosci. Psychol. 3, (2013).
[106] Eyal, N. How Technology is Like Bug Sex. Nir and Far (2013). Available at: https://www.nirandfar.com/2013/01/how-technology-is-like-bug-sex.html.
[107] Deaner, R. O., Khera, A. V. & Platt, M. L. Monkeys pay per view: adaptive valuation of social images by rhesus macaques. Curr. Biol. CB 15, 543–548 (2005).
[108] Krebs, R. M., Heipertz, D., Schuetze, H. & Duzel, E. Novelty increases the mesolimbic functional connectivity of the substantia nigra/ventral tegmental area (SN/VTA) during reward anticipation: Evidence from high-resolution fMRI. NeuroImage 58, 647–655 (2011).
[109] Julien, E. & Over, R. Male sexual arousal across five modes of erotic stimulation. Arch. Sex. Behav. 17, 131–143 (1988).
[110] Spicer, J. et al. Sensitivity of the nucleus accumbens to violations in expectation of reward. NeuroImage 34, 455–461 (2007).
[111] Hanson, H. Robot Handjobs Are The Future, And The Future Is Coming (NSFW) | HuffPost. Huffpost (2013). Available at: http://www.huffingtonpost. com/2013/11/12/robot-handjobs-vr-tenga_n_4261161.html.
[112] Weiss, R. Techy-Sexy: Digital Exploration of the Erotic Frontier. Psychology Today (2013).
[113] Anorak | The FriXion Revolution: Virtual Sex Just Got Intimate. Anorak News
[114] Newcastle University. The 'reality' of virtual reality pornography, http:// www.ncl.ac.uk/press/news/2017/05/vrporn/. (2017).
[115] Frohmader, K. S., Wiskerke, J., Wise, R. A., Lehman, M. N. & Coolen, L. M. Methamphetamine acts on subpopulations of neurons regulating sexual behavior in male rats. Neuroscience 166, 771–784 (2010).
[116] Pitchers, K. K. et al. Endogenous opioid-induced neuroplasticity of dopaminergic neurons in the ventral tegmental area influences natural and opiate reward. J. Neurosci. Off. J. Soc. Neurosci. 34, 8825–8836 (2014).
[117] Natural and Drug Rewards Act on Common Neural Plasticity Mechanisms with ΔFosB as a Key Mediator. Available at: https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3865508/.
[118] Nestler, E. J. Transcriptional mechanisms of addiction: role of ΔFosB. Philos. Trans. R. Soc. B Biol. Sci. 363, 3245–3255 (2008).

[119] Natural and Drug Rewards Act on Common Neural Plasticity Mechanisms with ΔFosB as a Key Mediator. Available at: https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3865508/.
[120] Phillips-Farfán, B. V. & Fernández-Guasti, A. Endocrine, neural and pharmacological aspects of sexual satiety in male rats. Neurosci. Biobehav. Rev. 33, 442–455 (2009).
[121] Garavan, H. et al. Cue-induced cocaine craving: neuroanatomical specificity for drug users and drug stimuli. Am. J. Psychiatry 157, 1789–1798 (2000).
[122] Christiansen, A. M., Dekloet, A. D., Ulrich-Lai, Y. M. & Herman, J. P. 'Snacking' causes long term attenuation of HPA axis stress responses and enhancement of brain FosB/deltaFosB expression in rats. Physiol. Behav. 103, 111–116 (2011).
[123] Belin, D. & Rauscent, A. DeltaFosB: a molecular gate to motivational processes within the nucleus accumbens? J. Neurosci. Off. J. Soc. Neurosci. 26, 11809–11810 (2006).
[124] Hedges, V. L., Chakravarty, S., Nestler, E. J. & Meisel, R. L. Delta FosB overexpression in the nucleus accumbens enhances sexual reward in female Syrian hamsters. Genes Brain Behav. 8, 442–449 (2009).
[125] Doucet, J. P. et al. Chronic alterations in dopaminergic neurotransmission produce a persistent elevation of deltaFosB-like protein(s) in both the rodent and primate striatum. Eur. J. Neurosci. 8, 365–381 (1996).
[126] Natural and Drug Rewards Act on Common Neural Plasticity Mechanisms with ΔFosB as a Key Mediator. Available at: https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3865508/.
[127] Wallace, D. L. et al. The influence of DeltaFosB in the nucleus accumbens on natural reward-related behavior. J. Neurosci. Off. J. Soc. Neurosci. 28, 10272–10277 (2008).
[128] Natural and Drug Rewards Act on Common Neural Plasticity Mechanisms with ΔFosB as a Key Mediator. Available at: https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3865508/.
[129] Wallace, D. L. et al. The influence of DeltaFosB in the nucleus accumbens on natural reward-related behavior. J. Neurosci. Off. J. Soc. Neurosci. 28, 10272–10277 (2008).
[130] Teegarden, S. L., Nestler, E. J. & Bale, T. L. Delta FosB-mediated alterations in dopamine signaling are normalized by a palatable high-fat diet. Biol. Psychiatry 64, 941–950 (2008).
[131] Werme, M. et al. Delta FosB regulates wheel running. J. Neurosci. Off. J. Soc. Neurosci. 22, 8133–8138 (2002).
[132] Nestler, E. J. Transcriptional mechanisms of addiction: role of ΔFosB. Philos. Trans. R. Soc. B Biol. Sci. 363, 3245–3255 (2008).
[133] Schiffer, W. K. et al. Cue-induced dopamine release predicts cocaine preference: positron emission tomography studies in freely moving rodents. J. Neurosci. Off. J. Soc. Neurosci. 29, 6176–6185 (2009).
[4] Nestler, E. J. Is there a common molecular pathway for addiction? Nat. Neurosci. 8, 1445–149 (2005).
[135] Berridge, K. C., Robinson, T. E. & Aldridge, J. W. Dissecting components of reward: 'liking', 'wanting', and learning. Curr. Opin. Pharmacol. 9, 65–73 (2009).
[136] Berridge, K. C., Robinson, T. E. & Aldridge, J. W. Dissecting components of reward: 'liking', 'wanting', and learning. Curr. Opin. Pharmacol. 9, 65–73 (2009).
[7] Voon, V. et al. Neural correlates of sexual cue reactivity in individuals with and without ompulsive sexual behaviours. PloS One 9, e102419 (2014); Gola, M. et al. Can Pornography e Addictive? An fMRI Study of Men Seeking Treatment for Problematic Pornography Use. europsychopharmacol. Off. Publ. Am. Coll. Neuropsychopharmacol. (2017). oi:10.1038/npp.2017.78
[138] The Mix. Porn vs Reality | The Mix. (2012).
[139] Pfaus, J. G. et al. Who, what, where, when (and maybe even why)? How the experience of sexual reward connects sexual desire, preference, and performance. Arch. Sex. Behav. 41, 31–62 (2012).

[140] Tydén, T. & Rogala, C. Sexual behaviour among young men in Sweden and the impact of pornography. Int. J. STD AIDS 15, 590–593 (2004).
[141] Stokes, P. R. A. et al. Nature or nurture? Determining the heritability of human striatal dopamine function: an [18F]-DOPA PET study. Neuropsychopharmacol. Off. Publ. Am. Coll. Neuropsychopharmacol. 38, 485–491 (2013).
[142] Selemon, L. D. A role for synaptic plasticity in the adolescent development of executive function. Transl. Psychiatry 3, e238 (2013).
[143] Galvan, A. et al. Earlier development of the accumbens relative to orbitofrontal cortex might underlie risk-taking behavior in adolescents. J. Neurosci. Off. J. Soc. Neurosci. 26, 6885–6892 (2006).
[144] Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016).
[145] University of Pittsburgh. Teen brains over-process rewards, suggesting root of risky behavior, mental ills. ScienceDaily Available at: https://www.sciencedaily. com/releases/2011/01/110126121732.htm.
[146] Nestler, E. J. Transcriptional mechanisms of addiction: role of ΔFosB. Philos. Trans. R. Soc. B Biol. Sci. 363, 3245–3255 (2008).
[147] Galvan, A. et al. Earlier development of the accumbens relative to orbitofrontal cortex might underlie risk-taking behavior in adolescents. J. Neurosci. Off. J. Soc. Neurosci. 26, 6885–6892 (2006).
[148] Voon, V. et al. Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. PloS One 9, e102419 (2014).
[149] Doremus-Fitzwater, T. L., Varlinskaya, E. I. & Spear, L. P. Motivational systems in adolescence: possible implications for age differences in substance abuse and other risk-taking behaviors. Brain Cogn. 72, 114–123 (2010).
[150] Weinberger, D. R., Elvevag, B. & Giedd, J. N. The Adolescent Brain: A Work in Progress. (June, 2005).
[151] Doremus-Fitzwater, T. L., Varlinskaya, E. I. & Spear, L. P. Motivational systems in adolescence: possible implications for age differences in substance abuse and other risk-taking behaviors. Brain Cogn. 72, 114–123 (2010).
[152] Flinders University. Best memory? You're likely to decide as a teen. Medical Xpress (2012). Available at: https://medicalxpress.com/news/2012-07-memory-youre-teen.html.
[153] Brom, M., Both, S., Laan, E., Everaerd, W. & Spinhoven, P. The role of conditioning, learning and dopamine in sexual behavior: A narrative review of animal and human studies. Neurosci. Biobehav. Rev. 38, 38–59 (2014).
[154] Griffee, K. et al. Human Sexual Development is Subject to Critical Period Learning: Implications for Sexual Addiction, Sexual Therapy, and for Child Rearing. Sex. Addict. Compulsivity 21, 114–169 (2014).
[155] Rachman, S. & Hodgson, R. J. Experimentally-Induced "Sexual Fetishism": Replication and Development. Psychol. Rec. 18, 25–27 (1968).
[156] Plaud, J. J. & Martini, J. R. The respondent conditioning of male sexual arousal. Behav. Modif. 23, 254–268 (1999).
[157] Pfaus, J. G. et al. Who, what, where, when (and maybe even why)? How the experience of sexual reward connects sexual desire, preference, and performance. Arch. Sex. Behav. 41, 31–62 (2012).
[158] Borg, C. & Jong, P. J. de. Feelings of Disgust and Disgust-Induced Avoidance Weaken following Induced Sexual Arousal in Women. PLOS ONE 7, e44111 (2012).

[159] Seigfried-Spellar, K. C. Deviant Pornography Use: The Role of Early-Onset Adult Pornography Use and Individual Differences. Int. J. Cyber Behav. Psychol. Learn. IJCBPL 6, 34–47 (2016).
[160] Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016); Gola, M. et al. Can Pornography be Addictive? An fMRI Study of Men Seeking Treatment for Problematic Pornography Use. Neuropsychopharmacol. Off. Publ. Am. Coll. Neuropsychopharmacol. (2017). doi:10.1038/npp.2017.78; Klucken, T., Wehrum-Osinsky, S., Schweckendiek, J., Kruse, O. & Stark, R. Altered Appetitive Conditioning and Neural Connectivity in Subjects With Compulsive Sexual Behavior. J. Sex. Med. 13, 627–636 (2016).
[161] Doidge, N. Sex on the Brain: What Brain Plasticity Teaches About Internet Porn. Hung. Rev. V, (2014).
[162] Park, B. Y. et al. Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. Behav. Sci. 6, (2016).

[163] Steinberg, E. E. et al. A causal link between prediction errors, dopamine neurons and learning. Nat. Neurosci. 16, 966–973 (2013).
[164] Giuliano, F. & Allard, J. Dopamine and male sexual function. Eur. Urol. 40, 601–608 (2001).
[165] Pfaus, J. G. & Scepkowski, L. A. The biologic basis for libido. Curr. Sex. Health Rep. 2, 95–100 (2005).
[166] Cera, N. et al. Macrostructural Alterations of Subcortical Grey Matter in Psychogenic Erectile Dysfunction. PLOS ONE 7, e39118 (2012).
[167] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014).
[168] Pitchers, K. K. et al. DeltaFosB in the nucleus accumbens is critical for reinforcing effects of sexual reward. Genes Brain Behav. 9, 831–840 (2010).
[169] Olsen, C. M. Natural rewards, neuroplasticity, and non-drug addictions. Neuropharmacology 61, 1109–1122 (2011).
[170] Johnson, P. M. & Kenny, P. J. Addiction-like reward dysfunction and compulsive eating in obese rats: Role for dopamine D2 receptors. Nat. Neurosci. 13, 635–641 (2010).
[171] Szalavitz, M. Can Food Really Be Addictive? Yes, Says National Drug Expert. TIME.com (2012). Available at: http://healthland.time.com/2012/04/05/yes-food-can-be-addictive-says-the-director-of-the-national-institute-on-drug-abuse/.
[172] Klein, S. Fatty foods may cause cocaine-like addiction - CNN.com. CNN. com (2010). Available at: http://www.cnn.com/2010/HEALTH/03/28/fatty.foods. brain/index.html
[173] Lenoir, M., Serre, F., Cantin, L. & Ahmed, S. H. Intense Sweetness Surpasses Cocaine Reward. PLOS ONE 2, e698 (2007).
[174] National Center for Health Statistics. Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults Aged 20 and Over: United States, 1960–1962 Through 2013–2014. Centers for Disease Control and Prevention Available at: https://www.cdc.gov/nchs/data/hestat/obesity_adult_13_14/obesity_adult_13_14.htm.
[175] ProvenMen. Pornography Survey Statistics (Conducted by Barna Group). Proven Men Available at: https://www.provenmen.org/pornography-survey-statistics-2014/.
[176] Wéry, A. & Billieux, J. Online sexual activities: An exploratory study of problematic and non-problematic usage patterns in a sample of men. Comput. Hum. Behav. 56, 257–266 (2016); Kraus, S. W., Martino, S. & Potenza, M. N. Clinical Characteristics of Men Interested in Seeking Treatment for Use of Pornography. J. Behav. Addict. 5, 169–178 (2016).

[177] Nestler, E. J. Is there a common molecular pathway for addiction? Nat. Neurosci. 8, 1445–1449 (2005).
[178] Volkow, N. D. et al. Addiction: Decreased reward sensitivity and increased expectation sensitivity conspire to overwhelm the brain's control circuit. BioEssays News Rev. Mol. Cell. Dev. Biol. 32, 748–755 (2010).
[179] Internet and Video Game Addiction Brain Studies. Your Brain on Porn Available at: https://yourbrainonporn.com/list-internet-video-game-brain-studies.
[180] Volkow, N. D., Koob, G. F. & McLellan, A. T. Neurobiologic Advances from the Brain Disease Model of Addiction. N. Engl. J. Med. 374, 363–371 (2016).

[181] Voon, V. et al. Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. PloS One 9, e102419 (2014); Brand, M. et al. Watching pornographic pictures on the Internet: role of sexual arousal ratings and psychological-psychiatric symptoms for using Internet sex sites excessively. Cyberpsychology Behav. Soc. Netw. 14, 371–377 (2011); Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016); Gola, M. et al. Can Pornography be Addictive? An fMRI Study of Men Seeking Treatment for Problematic Pornography Use. Neuropsychopharmacol. Off. Publ. Am. Coll. Neuropsychopharmacol. (2017). doi:10.1038/npp.2017.78; Schiebener, J., Laier, C. & Brand, M. Getting stuck with pornography? Overuse or neglect of cybersex cues in a multitasking situation is related to symptoms of cybersex addiction. J. Behav. Addict. 4, 14–21 (2015); Klucken, T., Wehrum-Osinsky, S., Schweckendiek, J., Kruse, O. & Stark, R. Altered Appetitive Conditioning and Neural Connectivity in Subjects With Compulsive Sexual Behavior. J. Sex. Med. 13, 627–636 (2016); Mechelmans, D. J. et al. Enhanced Attentional Bias towards Sexually Explicit Cues in Individuals with and without Compulsive Sexual Behaviours. PLoS ONE 9, (2014); Steele, V. R., Staley, C., Fong, T. & Prause, N. Sexual desire, not hypersexuality, is related to neurophysiological responses elicited by sexual images. Socioaffective Neurosci. Psychol. 3, (2013); Laier, C. & Brand, M. Empirical Evidence and Theoretical Considerations on Factors Contributing to Cybersex Addiction From a Cognitive-Behavioral View. Sex. Addict. Compulsivity 21, 305–321 (2014); Laier, C., Schulte, F. P. & Brand, M. Pornographic picture processing interferes with working memory performance. J. Sex Res. 50, 642–652 (2013); Laier, C., Pawlikowski, M., Pekal, J., Schulte, F. P. & Brand, M. Cybersex addiction: Experienced sexual arousal when watching pornography and not real-life sexual contacts makes the difference. J. Behav. Addict. 2, 100–107 (2013); Laier, C., Pekal, J. & Brand, M. Cybersex addiction in heterosexual female users of internet pornography can be explained by gratification hypothesis. Cyberpsychology Behav. Soc. Netw. 17, 505–511 (2014); Snagowski, J., Wegmann, E., Pekal, J., Laier, C. & Brand, M. Implicit associations in cybersex addiction: Adaption of an Implicit Association Test with pornographic pictures. Addict. Behav. 49, 7–12 (2015); Laier, C., Pekal, J. & Brand, M. Sexual Excitability and Dysfunctional Coping Determine Cybersex Addiction in Homosexual Males. Cyberpsychology Behav. Soc. Netw. 18, 575–580 (2015); Snagowski, J., Laier, C., Duka, T. & Brand, M. Subjective Craving for Pornography and Associative Learning Predict Tendencies Towards Cybersex Addiction in a Sample of Regular Cybersex Users. Sex. Addict. Compulsivity 23, 342-360 (2016); Banca, P., Harrison, N. A. & Voon, V. Compulsivity Across the Pathological Misuse of Drug and Non-Drug Rewards. Front. Behav. Neurosci. 10, (2016); Albery, I. P. et al. Exploring the Relationship between Sexual Compulsivity and Attentional Bias to Sex-Related Words in a Cohort of Sexually Active Individuals. Eur. Addict. Res. 23, 1–6 (2017); Snagowski, J. & Brand, M. Symptoms of cybersex addiction can be linked to both approaching and avoiding pornographic stimuli: results from an analog sample of regular cybersex users. Front. Psychol. 6, (2015); Laier, C. & Brand, M. Mood changes after watching pornography on the Internet are linked to tendencies towards Internet-pornography-viewing disorder. Addict. Behav. Rep. 5, 9–13 (2017).

[182] Natural and Drug Rewards Act on Common Neural Plasticity Mechanisms with ΔFosB as a Key Mediator. Available at: https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3865508/.

[183] Hyman, S. E. Addiction: a disease of learning and memory. Am. J. Psychiatry 162, 1414–1422 (2005).

[184] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014).

[185] Leyton, M. & Vezina, P. Striatal ups and downs: their roles in vulnerability to addictions in humans. Neurosci. Biobehav. Rev. 37, 1999–2014 (2013).
[186] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014); Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016); Albery, I. P. et al. Exploring the Relationship between Sexual Compulsivity and Attentional Bias to Sex-Related Words in a Cohort of Sexually Active Individuals. Eur. Addict. Res. 23, 1–6 (2017); Prause, N., Steele, V. R., Staley, C., Sabatinelli, D. & Hajcak, G. Modulation of late positive potentials by sexual images in problem users and controls inconsistent with "porn addiction". Biol. Psychol. 109, 192–199 (2015); Kunaharan, S., Halpin, S., Sitharthan, T., Bosshard, S. & Walla, P. Conscious and Non-Conscious Measures of Emotion: Do They Vary with Frequency of Pornography Use? Appl. Sci. 7, 493 (2017); Seok, J.-W. & Sohn, J.-H. Neural Substrates of Sexual Desire in Individuals with Problematic Hypersexual Behavior. Front. Behav. Neurosci. 9, (2015).
[187] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014); Negash, S., Sheppard, N. V. N., Lambert, N. M. & Fincham, F. D. Trading Later Rewards for Current Pleasure: Pornography Consumption and Delay Discounting. J. Sex Res. 53, 689–700 (2016); Schiebener, J., Laier, C. & Brand, M. Getting stuck with pornography? Overuse or neglect of cybersex cues in a multitasking situation is related to symptoms of cybersex addiction. J. Behav. Addict. 4, 14–21 (2015); Messina, B., Fuentes, D., Tavares, H., Abdo, C. H. N. & Scanavino, M. de T. Executive Functioning of Sexually Compulsive and Non-Sexually Compulsive Men Before and After Watching an Erotic Video. J. Sex. Med. 14, 347–354 (2017); Leppink, E. W., Chamberlain, S. R., Redden, S. A. & Grant, J. E. Problematic sexual behavior in young adults: Associations across clinical, behavioral, and neurocognitive variables. Psychiatry Res. 246, 230–235 (2016); Cheng, W. & Chiou, W.-B. Exposure to Sexual Stimuli Induces Greater Discounting Leading to Increased Involvement in Cyber Delinquency Among Men. Cyberpsychology Behav. Soc. Netw. (2017). doi:10.1089/cyber.2016.0582; Klucken, T., Wehrum-Osinsky, S., Schweckendiek, J., Kruse, O. & Stark, R. Altered Appetitive Conditioning and Neural Connectivity in Subjects With Compulsive Sexual Behavior. J. Sex. Med. 13, 627–636 (2016); Laier, C., Schulte, F. P. & Brand, M. Pornographic picture processing interferes with working memory performance. J. Sex Res. 50, 642–652 (2013); Seok, J.-W. & Sohn, J.-H. Neural Substrates of Sexual Desire in Individuals with Problematic Hypersexual Behavior. Front. Behav. Neurosci. 9, (2015); Laier, C., Pawlikowski, M. & Brand, M. Sexual picture processing interferes with decision-making under ambiguity. Arch. Sex. Behav. 43, 473–482 (2014); Miner, M. H., Raymond, N., Mueller, B. A., Lloyd, M. & Lim, K. O. Preliminary investigation of the impulsive and neuroanatomical characteristics of compulsive sexual behavior. Psychiatry Res. 174, 146–151 (2009); Schmidt, C. et al. Compulsive sexual behavior: Prefrontal and limbic volume and interactions. Hum. Brain Mapp. 38, 1182–1190 (2017); Reid, R. C., Karim, R., McCrory, E. & Carpenter, B. N. Self-reported differences on measures of executive function and hypersexual behavior in a patient and community sample of men. Int. J. Neurosci. 120, 120–127 (2010).

[188] Koob, G. F. & Le Moal, M. Addiction and the brain antireward system. Annu. Rev. Psychol. 59, 29–53 (2008).

[189] Chatzittofis, A. et al. HPA axis dysregulation in men with hypersexual disorder. Psychoneuroendocrinology 63, 247–253 (2016); Jokinen, J. et al. Methylation of HPA axis related genes in men with hypersexual disorder. Psychoneuroendocrinology 80, 67–73 (2017); The role of neuroinflammation in the pathophysiology of hypersexual disorder. ResearchGate Available at: https://www.researchgate.net/publication/306419104_The_role_of_neuroinflammation_in_the_pathophysiology_of_hypersexual_disorder.
[190] Hilts, P. J. Is Nicotine Addictive? It Depends on Whose Criteria You Use. New York Times (1994).
[191] Bőthe, B. et al. The Development of the Problematic Pornography Consumption Scale (PPCS). J. Sex Res. 1–12 (2017). doi:10.1080/00224499.2017.1291798; Out-of-control use of the internet for sexual purposes as behavioural addiction? 4th International Conference On Behavioral Addictions 6, 1–74 (2017).
[192] Web addicts' withdrawal symptoms similar to drug users. BBC News (2013).
[193] Romano, M., Osborne, L. A., Truzoli, R. & Reed, P. Differential Psychological Impact of Internet Exposure on Internet Addicts. PLOS ONE 8, e55162 (2013).
[194] Bőthe, B. et al. The Development of the Problematic Pornography Consumption Scale (PPCS). J. Sex Res. 1–12 (2017). doi:10.1080/00224499.2017.1291798; Out-of-control use of the internet for sexual purposes as behavioural addiction? 4Th International Conference On Behavioral Addictions 6, 1–74 (2017); Wéry, A. & Billieux, J. Online sexual activities: An exploratory study of problematic and non-problematic usage patterns in a sample of men. Comput Hum Behav 56, 257–266, (2016).
[195] Studies Find Escalation (and Habituation) in Porn Users | Your Brain On Porn. Available at: https://www.yourbrainonporn.com/studies-find-escalation-porn-users
[196] Hajela, R. & Love, T. Addiction Beyond Substances—What's Up with the DSM? Sex. Addict. Compulsivity 24, 11–22 (2017).
[197] ASAM. Public Policy Statement: Definition of Addiction. (2011). Available at: https://www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/ public-policy-statements/2011/12/15/the-definition-of-addiction
[198] Insel, T. Post by Former NIMH Director Thomas Insel: Transforming Diagnosis (Available at: https://www.nimh.nih.gov/about/directors/thomas-insel/blog/2013/transforming-diagnosis.shtml). National Institute of Mental Health (2013).
[199] Krueger, R. B. Diagnosis of hypersexual or compulsive sexual behavior can be made using ICD-10 and DSM-5 despite rejection of this diagnosis by the American Psychiatric Association. Addiction 111, 2110–2111 (2016).
[200] Disorders due to addictive behaviours. ICD-11 Beta Draft Available at: http://apps.who.int/classifications/icd11/browse/f/en#/http%3a%2f%2fid.who.int%2ficd%2fentity%2f499894965
[201] Potenza, M. N., Gola, M., Voon, V., Kor, A. & Kraus, S. W. Is excessive sexual behaviour an addictive disorder? Lancet Psychiatry 4, 663–664 (2017).
[202] Of 'Voting Booth Moments' and Porn. PornHelp.org Available at: http://www.pornhelp.org/1/post/2017/05/of-voting-booth-moments-and-porn.html
[203] Ahn, H. M., Chung, H. J. & Kim, S. H. Altered Brain Reactivity to Game Cues After Gaming Experience. Cyberpsychology Behav. Soc. Netw. 18, 474–479 (2015).
[204] Johnson, P. M. & Kenny, P. J. Addiction-like reward dysfunction and compulsive eating in obese rats: Role for dopamine D2 receptors. Nat. Neurosci. 13, 635–641 (2010).
[205] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014).
[206] Pizzol, D., Bertoldo, A. & Foresta, C. Adolescents and web porn: a new era of sexuality. Int. J. Adolesc. Med. Health 28, 169–173 (2015).

[207] Odgers, C. L. et al. Is it important to prevent early exposure to drugs and alcohol among adolescents? Psychol. Sci. 19, 1037–1044 (2008).
[208] Lam, L. T. & Peng, Z.-W. Effect of pathological use of the internet on adolescent mental health: a prospective study. Arch. Pediatr. Adolesc. Med. 164, 901–906 (2010).
[209] Dong, G., Lu, Q., Zhou, H. & Zhao, X. Precursor or Sequela: Pathological Disorders in People with Internet Addiction Disorder. PLOS ONE 6, e14703 (2011).
[210] Lin, I.-H. et al. The association between suicidality and Internet addiction and activities in Taiwanese adolescents. Compr. Psychiatry 55, 504–510 (2014).
[211] Huang, A. C. W., Chen, H.-E., Wang, Y.-C. & Wang, L.-M. Internet abusers associate with a depressive state but not a depressive trait. Psychiatry Clin. Neurosci. 68, 197–205 (2014).
[212] Ko, C.-H. et al. The exacerbation of depression, hostility, and social anxiety in the course of Internet addiction among adolescents: a prospective study. Compr. Psychiatry 55, 1377–1384 (2014).
[213] Tromholt, M. The Facebook Experiment: Quitting Facebook Leads to Higher Levels of Well-Being. Cyberpsychology Behav. Soc. Netw. 19, 661–666 (2016).
[214] Deng, L.-Y. et al. Craving Behavior Intervention in Ameliorating College Students' Internet Game Disorder: A Longitudinal Study. Front. Psychol. 8, (2017).
[215] Reset Your Child's Brain: A Four-Week Plan to End Meltdowns, Raise Grades, and Boost Social Skills by Reversing the Effects of Electronic Screen-Time: Victoria L. Dunckley MD: 9781608682843: Amazon.com: Books. Available at: https://www.amazon.com/Reset-Your-Childs-Brain-Screen-Time/dp/1608682846.
[216] Beyens, I., Vandenbosch, L. & Eggermont, S. Early Adolescent Boys' Exposure to Internet Pornography: Relationships to Pubertal Timing, Sensation Seeking, and Academic Performance. J. Early Adolesc. 35, 1045–1068 (2015).
[217] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014).
[218] Pitchers, K. K. et al. DeltaFosB in the nucleus accumbens is critical for reinforcing effects of sexual reward. Genes Brain Behav. 9, 831–840 (2010).
[219] de Oliveira, A. R. et al. Conditioned fear is modulated by D2 receptor pathway connecting the ventral tegmental area and basolateral amygdala. Neurobiol. Learn. Mem. 95, 37–45 (2011).
[220] PET Scans Link Low Dopamine Levels and Aggression | Diagnostic Imaging. Available at: http://www.diagnosticimaging.com/nuclear-imaging/pet-scans-link-low-dopamine-levels-and-aggression.
[221] Volkow, N. D. et al. Evaluating dopamine reward pathway in ADHD: clinical implications. JAMA 302, 1084–1091 (2009).
[222] Trifilieff, P. et al. Increasing dopamine D2 receptor expression in the adult nucleus accumbens enhances motivation. Mol. Psychiatry 18, 1025–1033 (2013).
[223] Volkow, N. D. et al. Motivation deficit in ADHD is associated with dysfunction of the dopamine reward pathway. Mol. Psychiatry 16, 1147–1154 (2011).
[224] Robinson, D. S. The Role of Dopamine and Norepinephrine in Depression. Primary Psychiatry (2007). Available at: http://primarypsychiatry.com/the-role-of-dopamine-and-norepinephrine-in-depression/.
[225] de Haan, L., Booij, J., Lavalye, J., van Amelsvoort, T. & Linszen, D. Subjective Experiences During Dopamine Depletion. Am. J. Psychiatry 162, 1755–1755 (2005).
[226] Kim, S. H. et al. Reduced striatal dopamine D2 receptors in people with Internet addiction. Neuroreport 22, 407–411 (2011).

[227] Sproten, A. How Abstinence Affects Preferences, http://www.alec-sproten.eu/ language/en/2016/01/18/how-abstinence-affects-preferences/. (2016).
[228] Ley, D. An Erectile Dysfunction Myth. Psychology Today (2013). Available at: http://www.psychologytoday.com/blog/women-who-stray/201308/erectile-dysfunction-myth.
[229] Hsiao, W. et al. Exercise is associated with better erectile function in men under 40 as evaluated by the International Index of Erectile Function. J. Sex. Med. 9, 524–530 (2012).
[230] MacRae, P. G., Spirduso, W. W., Walters, T. J., Farrar, R. P. & Wilcox, R. E. Endurance training effects on striatal D2 dopamine receptor binding and striatal dopamine metabolites in presenescent older rats. Psychopharmacology (Berl.) 92, 236–240 (1987).
[231] Smith, M. A., Schmidt, K. T., Iordanou, J. C. & Mustroph, M. L. Aerobic exercise decreases the positive-reinforcing effects of cocaine. Drug Alcohol Depend. 98, 129–135 (2008).
[232] Shevchuk, N. A. Adapted cold shower as a potential treatment for depression. Med. Hypotheses 70, 995–1001 (2008).
[233] Researchers find time in wild boosts creativity, insight and problem solving. The University of Kansas (2012). Available at: https://news.ku.edu/2012/04/23/ researchers-find-time-wild-boosts-creativity-insight-and-problem-solving.
[234] Tranquil scenes have positive impact on brain. ScienceDaily Available at: https://www.sciencedaily.com/releases/2010/09/100914095932.htm.
[235] Parker-Pope, T. Is Marriage Good for Your Health? - The New York Times. Available at: http://www.nytimes.com/2010/04/18/magazine/18marriage-t.html.
[236] The underlying anatomical correlates of long-term meditation: larger hippocampal and frontal volumes of gray matter. - PubMed - NCBI. Available at: https://www.ncbi.nlm.nih.gov/pubmed/19280691.
[237] Twohig, M. P. & Crosby, J. M. Acceptance and commitment therapy as a treatment for problematic internet pornography viewing. Behav. Ther. 41, 285–295 (2010).
[238] "How I Recovered from Porn-related Erectile Dysfunction" | Your Brain On Porn. Available at: https://yourbrainonporn.com/how-i-recovered-from-porn-related-erectile-dysfunction
[239] Barlow, D. H., Sakheim, D. K. & Beck, J. G. Anxiety increases sexual arousal. J. Abnorm. Psychol. 92, 49–54 (1983).
[240] Avena, N. M., Rada, P. & Hoebel, B. G. Evidence for sugar addiction: Behavioral and neurochemical effects of intermittent, excessive sugar intake. Neurosci. Biobehav. Rev. 32, 20–39 (2008).
[241] Natural and Drug Rewards Act on Common Neural Plasticity Mechanisms with ΔFosB as a Key Mediator. Available at: https://www.ncbi.nlm.nih.gov/pmc/ articles/PMC3865508/.
[242] Cottone, P. et al. CRF system recruitment mediates dark side of compulsive eating. Proc. Natl. Acad. Sci. 106, 20016–20020 (2009).
[243] Becker, H. C., Diaz-Granados, J. L. & Weathersby, R. T. Repeated ethanol withdrawal experience increases the severity and duration of subsequent withdrawal seizures in mice. Alcohol Fayettev. N 14, 319–326 (1997).
[244] Cameron, C. M., Wightman, R. M. & Carelli, R. M. One month of cocaine abstinence potentiates rapid dopamine signaling in the nucleus accumbens core. Neuropharmacology 111, 223–230 (2016).
[245] Grubbs, J. B., Stauner, N., Exline, J. J., Pargament, K. I. & Lindberg, M. J. Perceived addiction to Internet pornography and psychological distress: Examining relationships concurrently and over time. Psychol. Addict. Behav. J. Soc. Psychol. Addict. Behav. 29, 1056–1067 (2015).

[246] Why does a vivid memory 'feel so real?' ScienceDaily Available at: https://www.sciencedaily.com/releases/2012/07/120723134745.htm.
[247] Toates, F. How sexual desire works: The enigmatic urge. (Cambridge University Press, 2014).
[248] Seigfried-Spellar, K. C. Deviant Pornography Use: The Role of Early-Onset Adult Pornography Use and Individual Differences. Int. J. Cyber Behav. Psychol. Learn. IJCBPL 6, 34–47 (2016); Seigfried-Spellar, K. C. & Rogers, M. K. Does deviant pornography use follow a Guttman-like progression? 29, 1997–2003 (2013).
[249] Reddit/NoFap. Porn Genre Survey April 2012 - Summary Results.pdf. Reddit/ NoFap Available at: https://docs.google.com/file/d/0B7q3tr4EV02wbkpTTVk4R2VGbm8/edit?pli=1&usp=embed_facebook.
[250] Miner, M. H. et al. Understanding the Personality and Behavioral Mechanisms Defining Hypersexuality in Men Who Have Sex With Men. J. Sex. Med. 13, 1323–1331 (2016); Štulhofer, A., Jurin, T. & Briken, P. Is High Sexual Desire a Facet of Male Hypersexuality? Results from an Online Study. J. Sex Marital Ther. 42, 665–680 (2016); Carvalho, J., Štulhofer, A., Vieira, A. L. & Jurin, T. Hypersexuality and high sexual desire: exploring the structure of problematic sexuality. J. Sex. Med. 12, 1356–1367 (2015).
[251] Tarek Pacha, DO. Part #1: Porn Induced Erectile Dysfunction (PIED): problem and scope. (2016).
[252] Thompson, D. Study sees link between porn and sexual dysfunction. Available at: https://medicalxpress.com/news/2017-05-link-porn-sexual-dysfunction.html.
[253] Patel, A. This is the real reason young men suffer from erectile dysfunction. Netdoctor (2017). Available at: http://www.netdoctor.co.uk/healthy-living/sexual-health/a26930/the-real-reason-young-men-suffer-from-erectile-dysfunction/.
[254] Ko, C.-H. et al. The exacerbation of depression, hostility, and social anxiety in the course of Internet addiction among adolescents: a prospective study. Compr. Psychiatry 55, 1377–1384 (2014).

[255] Park, B. Y. et al. Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. Behav. Sci. 6, (2016); Stark, R. & Klucken, T. Neuroscientific Approaches to (Online) Pornography Addiction. in Internet Addiction 109–124 (Springer, Cham, 2017). doi:10.1007/978-3-319-46276-9_7; Love, T., Laier, C., Brand, M., Hatch, L. & Hajela, R. Neuroscience of Internet Pornography Addiction: A Review and Update. Behav. Sci. Basel Switz. 5, 388–433 (2015); Phillips, B., Hajela, R. & Hilton, D. L. JR. Sex Addiction as a Disease: Evidence for Assessment, Diagnosis, and Response to Critics. Sex. Addict. Compulsivity 22, 167–192 (2015); Kraus, S. W., Voon, V. & Potenza, M. N. Neurobiology of Compulsive Sexual Behavior: Emerging Science. Neuropsychopharmacology 41, 385–386 (2016); Kraus, S. W., Voon, V. & Potenza, M. N. Should compulsive sexual behavior be considered an addiction? Addiction 111, 2097–2106 (2016); Kühn, S. & Gallinat, J. Neurobiological Basis of Hypersexuality. in (ed. Neurobiology, International Review of Neurobiology) (Academic Press); Griffiths, M. D. Compulsive sexual behaviour as a behavioural addiction: the impact of the internet and other issues. Addiction 111, 2107–2108 (2016); Brand, M. & Laier, C. Cybersexsucht. Suchttherapie 16, 173–178 (2015); Kraus, S. W., Voon, V., Kor, A. & Potenza, M. N. Searching for clarity in muddy water: future considerations for classifying compulsive sexual behavior as an addiction. Addiction 111, 2113–2114 (2016); Brand, M., Young, K. S., Laier, C., Wölfling, K. & Potenza, M. N. Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. Neurosci. Biobehav. Rev. 71, 252–266 (2016); Hilton Jr., D. L., Carnes, S. & Love, T. L. The Neurobiology of Behavioral Addictions. in Neurobiology of Addiction 176–190 (Oxford University Press, 2016).

[256] Goldsmith, K., Dunkley, C. R., Dang, S. S. & Gorzalka, B. B. Pornography consumption and its association with sexual concerns and expectations among young men and women. Can. J. Hum. Sex. (2017). doi:10.3138/cjhs.262-a2

[257] Perry, S. L. & Schleifer, C. Till Porn Do Us Part? A Longitudinal Examination of Pornography Use and Divorce. J. Sex Res. 1–13 (2017). doi:10.1080/002244 99.2017.1317709

[258] Wright, P. J., Tokunaga, R. S. & Kraus, A. A Meta-Analysis of Pornography Consumption and Actual Acts of Sexual Aggression in General Population Studies. J. Commun. 66, 183–205 (2016).

[259] Steele, V. R., Staley, C., Fong, T. & Prause, N. Sexual desire, not hypersexuality, is related to neurophysiological responses elicited by sexual images. Socioaffective Neurosci. Psychol. 3, (2013).

[260] Prause, N., Steele, V. R., Staley, C., Sabatinelli, D. & Hajcak, G. Modulation of late positive potentials by sexual images in problem users and controls inconsistent with “porn addiction”. Biol. Psychol. 109, 192–199 (2015).

[261] Nikky Prause (client). media 2x3 Available at: http://media2x3.com/category/ nikky-prause/.

[262] New Brain Study Questions Existence of “Sexual Addiction”. Psychology Today Available at: http://www.psychologytoday.com/blog/the-sexual-continuum/201307/ new-brain-study-questions-existence-sexual-addiction.

[263] Park, B. Y. et al. Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. Behav. Sci. 6, (2016); Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016); Kunaharan, S., Halpin, S., Sitharthan, T., Bosshard, S. & Walla, P. Conscious and Non-Conscious Measures of Emotion: Do They Vary with Frequency of Pornography Use? Appl. Sci. 7, 493 (2017); Love, T., Laier, C., Brand, M., Hatch, L. & Hajela, R. Neuroscience of Internet Pornography Addiction: A Review and Update. Behav. Sci. Basel Switz. 5, 388–433 (2015); Hilton, D. L. 'High desire', or 'merely' an addiction? A response to Steele et al. Socioaffective Neurosci. Psychol. 4, (2014).
[264] Prause, N., Steele, V. R., Staley, C., Sabatinelli, D. & Hajcak, G. Modulation of late positive potentials by sexual images in problem users and controls inconsistent with "porn addiction". Biol. Psychol. 109, 192–199 (2015).
[265] Kühn, S. & Gallinat, J. Brain Structure and Functional Connectivity Associated With Pornography Consumption: The Brain on Porn. JAMA Psychiatry 71, 827–834 (2014).
[266] Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016).
[267] Park, B. Y. et al. Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. Behav. Sci. 6, (2016); Kunaharan, S., Halpin, S., Sitharthan, T., Bosshard, S. & Walla, P. Conscious and Non-Conscious Measures of Emotion: Do They Vary with Frequency of Pornography Use? Appl. Sci. 7, 493 (2017); Love, T., Laier, C., Brand, M., Hatch, L. & Hajela, R. Neuroscience of Internet Pornography Addiction: A Review and Update. Behav. Sci. Basel Switz. 5, 388–433 (2015); Kraus, S. W., Voon, V. & Potenza, M. N. Neurobiology of Compulsive Sexual Behavior: Emerging Science. Neuropsychopharmacology 41, 385–386 (2016); Kraus, S. W., Voon, V. & Potenza, M. N. Should compulsive sexual behavior be considered an addiction? Addiction 111, 2097–2106 (2016); Gola, M. Decreased LPP for sexual images in problematic pornography users may be consistent with addiction models. Everything depends on the model. (Commentary on Prause, Steele, Staley, Sabatinelli, & Hajcak, 2015). Biol. Psychol. 120, 156–158 (2016).
[268] Gola, M. Decreased LPP for sexual images in problematic pornography users may be consistent with addiction models. Everything depends on the model. (Commentary on Prause, Steele, Staley, Sabatinelli, & Hajcak, 2015). Biol. Psychol. 120, 156–158 (2016).
[269] Stark, R. & Klucken, T. Neuroscientific Approaches to (Online) Pornography Addiction. in Internet Addiction 109–124 (Springer, Cham, 2017). doi:10.1007/978-3-319-46276-9_7; Kühn, S. & Gallinat, J. Neurobiological Basis of Hypersexuality. in (ed. Neurobiology, International Review of Neurobiology) (Academic Press).
[270] ICD-11 Beta Draft, Comment by Nicole Prause. (2017). Available at: http://apps.who.int/classifications/icd11/browse/f/en#/http%3a%2f%2fid.who.int%2ficd%2fentity%2f1630268048.
[271] NoFap April 2012 Survey - Summary Results.pdf. NoFap 20112 Survey -Google Docs Available at: https://drive.google.com/a/reuniting.info/file/d/0B7q3tr4EV02weTFmV0oySnpJZjA/view?usp=drive_web&usp=embed_facebook.
[272] Wilson, G. Eliminate Chronic Internet Pornography Use to Reveal Its Effects. ADDICTA Turk J Addict 3, 1–13 (2016).
[273] Hatch, L. The Bogus Sex Addiction 'Controversy' and the Purveyors of Ignorance. Psych Central.com Available at: http://blogs.psychcentral.com/sex-addiction/2014/03/the-bogus-porn-addiction-controversy-and-the-purveyors-of-ignorance/
[274] Marston, C. & Lewis, R. Anal heterosex among young people and implications for health promotion: a qualitative study in the UK. BMJ Open 4, e004996 (2014).

[275] Researchers find time in wild boosts creativity, insight and problem solving. The University of Kansas (2012). Available at: https://news.ku.edu/2012/04/23/ researchers-find-time-wild-boosts-creativity-insight-and-problem-solving.
[276] Banca, P. et al. Novelty, conditioning and attentional bias to sexual rewards. J. Psychiatr. Res. 72, 91–101 (2016).
[277] Janssen, E. & Bancroft, J. The Psychophysiology of Sex., Chapter: The Dual-Control Model: The role of sexual inhibition & excitation in sexual arousal and behavior. in The Psychophysiology of Sex 197–222 (Indiana University Press, 2007); Downing, M. J., Schrimshaw, E. W., Scheinmann, R., Antebi-Gruszka, N. & Hirshfield, S. Sexually Explicit Media Use by Sexual Identity: A Comparative Analysis of Gay, Bisexual, and Heterosexual Men in the United States. Arch. Sex. Behav. (2016). doi:10.1007/s10508-016-0837-9
[278] Blair, O. Virtual reality pornography could raise issues about consent, researchers warn | The Independent. Available at: http://www.independent.co.uk/ life-style/love-sex/porn-virtual-reality-pornography-consent-issues-reality-fantasy-tech-a7744536.html.
[279] Zolo, M. I tried VR porn, and we are F**KED. | Naughty Nomad, Available at http://naughtynomad.com/2016/11/02/i-tried-vr-porn-and-we-are-fked.